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EDMUND RUFFIN, EDITOR AND PROPRIETOR.

REPORT TO THE HOUSE OF REPRESENTATIVES OF THE UNITED STATES ON SILK.

Read, and laid upon the table, February 25, 1837.

Mr. Adams, of Massachusetts, from the Committee on Manufactures, to which the subject had been referred, made the following report:

The Committee on Manufactures, to whom, at the last session of Congress, was referred a resolution of the house, instructing them to inquire into the expediency of promoting the culture and manufacture of silk in the United States, respectfully report:

That, in fulfilment of the instruction of the house, Mr. Andrew T. Judson, of Connecticut, then a member of the house, and of the committee, was authorized and requested by the committee to continue and pursue the inquiries which, for some time before, he had already commenced, to obtain from various parts of the United States the information respecting the actual condition and prospects of those important articles of cultivation which might most effectively promote the purposes of the resolution of the house; that those inquiries were accordingly pursued with equal perseverance and intelligence by Mr. Judson, but without his being able to complete them before the close of that session of Congress; that, previous to that time, his services being required in another department, he resigned his seat as a member of the house.

But Mr. Judson did not, on that account, intermit or relax the researches upon which he had devoted his time and attention in relation to the cultivation and manufacture of silk. He obtained the assistance and co-operation, in the prosecution of his inquiries, of F. G. Comstock, secretary of the Hartford County Silk Society, and editor of the Silk Culturist, a periodical journal published at Hartford, and especially devoted to this interesting cultivation. Twenty-two numbers of this valuable work have been transmitted by Mr. Comstock to the committee, together with a practical treatise by him on the culture of silk, adapted to the soil and climate of the United States.

A letter from Mr. Judson of the 21st of January last, to the chairman of the Committee on Manufactures, contains a concise summary of the information collected by him pursuant to the charge of the committee, and in furtherance of the views indicated by the resolution of the house. The chairman is instructed, by the committee, to present that letter to the house, and to move that it be received as a part of their report.

JOHN QUINCY ADAMS.

House of Representatives U. S., Feb. 25, 1837.

Canterbury, Con., January 21, 1837.

Sir—Having had the honor to be a member of the Committee on Manufactures, at the last session of Congress, when that committee was instructed, by a resolution of the house, "to inquire into the culture and manufacture of silk in the United States," and having been directed by the committee to make the report, I have devoted that attention to the subject which its nature, and my other duties, would allow; and now have the honor of communicating to you the result of my investigations, that it may be submitted to the members *now* composing the committee on manufactures.

It was my intention to have prepared a report at the last session, but the time intervening between the assignment of the duty to me, and the close of the session, rendered it utterly impracticable. The gentlemen who had engaged, and were engaging, in the business, were scattered throughout the whole extent of the country, and it was impossible to ascertain what progress they had made, in the short time allotted me. The want of this information, and the suggestion of a gentleman whose time is exclusively devoted to the introduction of the business, and who kindly proffered me the use of his extensive correspondence, and the aid of his personal services, in collecting the facts during the recess, induced me to defer it till the present session. Under these circumstances, I have thought the subsequent resignation of my seat in congress, would not exonerate me from the discharge of the duty thus imposed, or furnish an apology for neglecting it. In addition to this, I was aware the brief period prescribed by the constitution for the present session would be inadequate to a thorough investigation, should the duty of preparing a report be assigned to another member of the committee, and the expectations of the house and the public must, at least for a time, be disappointed. This explanation will, I trust, exempt me from what otherwise might appear to be an officious interference with the business and duties of the committee.

It is already known to the committee, that the culture of silk has been attempted in this country at different periods of time; the principal, however, of which, fall within the last century. It would be interesting, and probably useful, to trace the history of this branch of rural economy from the first attempt to introduce it in Virginia, in 1623, by James I. to the present time; but, as it has been compiled and embodied in a manual prepared under the direction of the Secretary of the Treasury, in pursuance of a resolution of the house passed on the 11th of May, 1836, I have deemed it advisable to confine my inquiries to the present state of the culture and manufacture of silk, and the more immediate causes which have produced it.

The present state of these branches of American industry, and the interest which is so extensively felt in relation to them, owe their origin principally to the efforts of a few patriotic gentlemen of the county of Hartford, in Connecticut. In the year 1834, they formed an association under the name of the "Hartford County Silk Society," for the purpose of collecting and disseminating practical information relating to the best methods of cultivating the various species and varieties of the mulberry, and rearing the silkworm. To facilitate their operations, and open a channel of commu-

nication with the public, they immediately commenced the publication of a monthly periodical, under the significant name of "Silk Culturist and Farmers' Manual," and placed it under the editorial charge of the secretary of the society. The editor immediately entered upon the discharge of his duties, and has since devoted his whole time and attention to the subject. The officers and members of the society, particularly the president and secretary, being practical men, and ardently devoted to the cause as a great national object, have been incessant and unwearied in their exertions to accomplish its general introduction. In their endeavors to draw the attention of the public, and particularly agriculturists, to the subject, and stimulate them to engage in it as an important and lucrative branch of rural economy, they have cautiously, and I think wisely, passed over the ingenious theories of foreign writers, and confined themselves to the results of experiments fairly and faithfully made, and the simple statement of facts. This course will approve itself to the understanding of every individual of reflection, especially when the variation of soil and climate of different countries, and the dissimilarity in the habits and pursuits of their inhabitants, are taken into consideration.

The anticipation of a sudden transition from poverty to competence, or from competence to wealth, is, of itself, a powerful incentive to embark in any new project which presents itself to the mind; but the disappointment and mortification consequent upon it, when illusory, are as painful, as the success is gratifying when real. The proneness of man to "air-castle building" needs no encouragement, but requires restraint; and the individual or individuals, who take the responsibility of recommending to the farmer a deviation from his ordinary routine of husbandry, must be careful that the advantages proposed are real rather than imaginary, or they will ultimately awaken in their own bosoms painful instead of pleasurable sensations. These principles seem to be the cardinal points in the faith of the Hartford County Silk Society, and by them the members appear to have scrupulously governed themselves, in promoting the great object of their association.

The publication of the Silk Culturist, at a merely nominal price, and on the personal responsibility of the secretary, has exerted a powerful influence in awakening a deep interest in these new branches of American enterprise. The extent of this interest may be judged of by the fact, that most of the political, commercial, and literary publications of the day, contain paragraphs urging farmers and others to engage in them, and assuring them of their practicability and profit. These show the light in which the subject is viewed by intelligent men, in different sections of the country, as a public object. The extent, also, of the interest felt by individuals in the success of the enterprise, as a source of individual wealth, may be estimated by the fact, that there are now in the office of the Silk Culturist from three to five thousand letters of inquiry, &c., in relation to it. This interest is further manifested by the fact, that several other periodicals devoted wholly and partially to the subject have been started, and are co-operating in the great work.

But notwithstanding both the public and individuals may be deeply interested in the culture and manufacture of silk, its introduction into this country may be unattainable. Our soil and climate may not be congenial to its growth, and the number, habits and pursuits of our population may not be adapted to its manufacture. These are insuperable difficulties, if they exist; and, consequently, I have given them a prominent place among the topics of investigation. The result of all my inquiries in relation to the adaptation of our soil and climate are of the most encouraging character. From all the information I have been able to obtain, I am fully satisfied that there is not a state in the union, and perhaps I might say not a county, where the mulberry may not be cultivated, and the silkworm reared. Experiments have been made in all parts of the country, and their success has established the fact, that the mulberry will grow, and the silkworm thrive, throughout the whole length and breadth of the United States. The rigor of northern winters has, ordinarily, no injurious effect upon the Italian mulberry; and the insect which feeds upon its foliage, and produces the silken fibre, being in a torpid state, and secluded from the frost during the cold season, sustains no injury, or even inconvenience, from its severity. It was formerly doubted whether the *morus multicaulis* could be acclimated in the northern and middle states; but late experiments have satisfactorily proved that, by cutting down the shoots in autumn, the roots will endure the coldest winters, and send up a new growth of shoots in the spring, and produce an abundant crop of foliage. This appears to be the method successfully pursued by the silk growers in India; and with the same treatment in this country, there is no doubt of its acclimation.

The introduction of this valuable variety of the mulberry, at a time when the attention of American silk growers was aroused to the subject, and the facility with which it is cultivated and multiplied to an indefinite extent, affords, in my opinion, a full guaranty against those failures and interruptions in the business to which it has heretofore been subjected. It has been ascertained by experiment, that the foliage which may be gathered from annual shoots upon an acre of land will furnish food enough to sustain a family of worms sufficiently numerous to make one hundred and twenty eight pounds of silk, worth, at present prices, six hundred and forty dollars. Though there is now but little doubt that, treated in this manner, the *morus multicaulis* will, in the end, supplant the Italian, yet it is adjudged advisable, by most silk growers, to continue its cultivation. Its great valve for fuel and timber, especially for ship building, will ever make it worthy of cultivation; and should any unforeseen circumstance render the successful cultivation of the former uncertain, or impossible, the silk grower will be able to make silk from its foliage, of good quality, and in large quantities.

An imaginary difficulty in rearing the worm, and enabling it to make its cocoon, has been urged as a reason against attempting it; but I am happy to find that the process has been so far simplified as to be intelligible to the most unlearned in rural affairs. So simple and easy is the care and management of the worm, during its brief life of labor, that children, with a little instruction and experience, can supply all its wants, both in sickness and in health, and render it all the assistance and attention necessary to its comfort and the completion of its labors. The process of reeling, also, which was formerly

supposed to be of difficult performance, has become so familiarized, that children perform it with skill and dexterity. In foreign countries, where silk is extensively grown and manufactured, the business of reeling is kept, to a great extent, distinct from the growing; but I think it desirable for every grower in this country to acquaint himself and family with the art, as the value of the silk is more easily and accurately ascertained, and is less liable to injury in transportation. Thus far, the production and manufacture of silk may be carried on in the family of every farmer, and at a profit far beyond his expectations.

From all the facts in my possession, I am satisfied that every farmer may devote a portion of his farm and attention to the growth of silk, and thereby much increase the value of its products. The gathering of the foliage, and the feeding of the worms, may be performed by the children, and such other members of the family as are incapable of more arduous labor; and who, if not thus employed, would spend their time in idleness, or, what is worse, mischief. If productive labor is a principal source of wealth, both to nations and individuals, it is desirous it should be increased to its greatest possible extent. This can only be done by seeking out objects to which the labor of the young, old, and infirm, is adapted; and, among these, I know of none more appropriate than the culture of silk. The same remarks are substantially true with respect to its manufacture.

It has also been erroneously supposed that the manufacture of silk was attended with extraordinary difficulties; that it required much complex and expensive machinery, and a skill which Americans were incapable of acquiring; but it has been found to be as simple as that of cotton or wool, and requiring a far less expenditure in buildings, machinery, and fixtures. The weaving of silk fabrics on power-looms has been attempted, and the success that has resulted from the experiment is of the most flattering character. Fabrics for gentlemen's wear, cravats, &c., have been woven on power-looms, which, for beauty of texture, fall but little, if any, below those of foreign manufacture. In this respect, we are already in advance of the silk manufacturers of Europe and India; and it is believed that the advantage the American manufacturer will derive from the aid of labor-saving machines, will more than counterbalance the advantage the foreign manufacturer does or can derive from the reduced price of labor in countries of a more dense population. Hence it is believed that this country can successfully compete with other countries, both in the culture and manufacture of silk.

The importance of introducing this species of manufacture may be estimated by the fact, that the importations of manufactured silks, during the year ending the 30th of September last, amounted to $ 17,497,900, being nearly a million more than the previous year. Most of this enormous amount is consumed in this country, and is an annual tax upon the consumers. It is also to them and the country a total loss; for it is believed there are in the country a sufficient number of laborers to produce and manufacture the whole amount, who are unproductively or unprofitably employed. If this be so, it follows, as a necessary consequence, that we sustain an annual loss of double that amount in our unemployed and misapplied labor. This amount will also be astonishingly increased, if we add to it all the evils of crime and pauperism, which are the legitimate and unavoidable consequences of idleness and unproductive labor. The connection between idleness and poverty has not, and never will be dissolved, so long as the relation between cause and effect exists; and though crime may not be a necessary concomitant, yet it is a common attendant. The same is true, though in a less degree, in regard to misapplied labor. The fruits of unproductive labor are poverty and wretchedness, and those are often the remote, if not the immediate, causes of crime. The importance, therefore, of the culture and manufacture of silk, both in a pecuniary and moral point of view, is immense.

Our independence also urges us to engage in the culture and manufacture of silk. Fabrics, of which silk is the whole, or a component part, are indispensable. In the early ages of the world, when the customs and fashion of society were rude and unpolished, silk was considered a luxury which none but princes could indulge; and even in them it was supposed to be unpardonable extravagance, for it was among the enumerated prodigalities of Heliogabalus, that he had a garment made wholly of silk. The Emperor Aurelian, also, two hundred and seventy years afterwards, refused his empress a silk robe, merely because he could not incur the expense. In still later times silk has been considered luxurious, for it is said of James I, before his accession to the English throne in 1603, that he was compelled to borrow a pair of silk hose of the Earl of Mar, when he first appeared before the ambassador. But the customs and habit of society have since undergone an astonishing change. Silk is no longer considered a luxury, but an indispensable article. So common has it become, that it forms a considerable part of our wardrobes, and enters more or less into almost every garment, both of male and female dress. However unnecessary and extravagant silk may have anciently been considered, it cannot now be dispensed with, neither can its consumption be confined to the wealthy. Time was, and now is in some countries, when different orders in society, growing out of rank and wealth, existed; but this state of things no longer continues in this country. Wealth and descent are no longer the thermometer of respectability, but industry, frugality, and the practice of the moral and social virtues. The poor as well as the rich must be clothed in silk: and why should they not? they are as meritorious, and often more so. The question is, therefore, settled, that there can be no diminution in the consumption of silk; and unless measures are taken to encourage its culture, we must be forever dependent on foreign labor for its production. Though foreign laborers may be dependent on us for the consumption of their products, yet it detracts much from our independence to be dependent on them for necessary articles of clothing. It is true, while our amicable relations with foreign countries continue, we shall be supplied; the advantage they derive from this item of our commercial dealing will ever afford us a guaranty against want in times of peace; yet our intercourse may be interrupted by war, and we be thrown upon our own resources for the production of this staple article of consumption. But if this state of things cannot be reasonably anticipated, our love of independence, and, above all, a pru-

dent national economy, should prompt us to prosecute a branch of industry which promises such important results, and the practicability or feasibility of which is no longer a problem.

The importance of this branch of rural economy is also much increased, by the facilities it affords to all to attain competence and wealth. There is probably no other business, in which the same amount of capital will yield an equal amount of income. It will not be expected that I shall go into an accurate calculation of the product and profit of a plantation and cocoonery; yet, perhaps, I ought to say, that, within the range of my own observation, there can be no better investment of capital. The small amount of capital necessary to a commencement of the business is also a facility which no other branch of business, within my knowledge, holds out to the enterprising. A few acres of land of ordinary fertility, and a few dollars in money for the purchase of seed and plants, will enable a silk grower to lay the foundation for a plantation on a considerable scale.

Another facility peculiar to the business is the ease with which operations are extended. without a corresponding extension of capital. The ratio in which the *morus multicaulis* may be multiplied, by means of cuttings and layers, is truly astonishing. Experiments have proved that, with a little labor and attention, they may be more than quadrupled every year. This will enable the farmer in moderate circumstances to compete with the capitalist, and prevent monopolizers from engrossing the whole of the business and its profits. To the individual of limited means, and a large family of children dependent on him for support and education, the culture of silk holds out encouragement of extraordinary promise; while, at the same time, it affords ample opportunity for the capitalist, or the incorporated company, to make large investments with the moral certainty of success.

The culture and manufacture of silk must also, for a long time at least, be free from the depressions and embarrassments which, at times, are thrown upon other species of manufacture by enterprise and competition. Before the present prices can be materially reduced, an amount of domestic silk equal to the large amount annually imported must be produced; and this cannot be expected, while enterprise and labor have so many objects on which to expend themselves, as the various sections, climates, interests, and pursuits of this extensive country present. The disproportion also which has existed for the last twenty or thirty years, between the increase in the consumption of silk, and the increase of population, and which is becoming greater every year, will, it is believed, prevent the American silk growers, with all the aid and encouragement which may be extended to them by the national and state legislatures, from producing the raw material in sufficient quantities to supply the demand, for at least another century.

A good beginning, however, has been made, and the business commenced under the most favorable auspices. In the month of September, I caused a circular to be prepared, propounding twenty-six interrogatories to silk growers, manufacturers, and other gentlemen interested in the subject. Several hundred were circulated; and many have been returned with answers to the inquiries. It is, however, to be regretted they were not forwarded at an earlier day, as a more punctual and general return would have been the consequence, and a greater amount of information collected. The facts, however, as far as they have been collected, (and they are as numerous and circumstantial as under the circumstances could be expected,) are of the most flattering character. From the answers to the interrogatories, the communications of gentlemen in different parts of the country, and such other means of information as I have been favored with, I am enabled to give the following exhibit of the progress and prospect of both branches of the business. The statements being made from correct data, may be relied on, as approximating to accuracy, as far as they go: but it is reasonable to suppose that the view is imperfect, as the business has probably been commenced in many parts of the country, from which no information has been received. These, of course are not embraced: and the business is, no doubt, further advanced, and in a more prosperous condition, than will be exhibited.

New England States.

The six New England States are, more or less, engaged in the culture and manufacture of silk; and four of them are encouraging the business by legislative bounties. In Maine, a bounty of five cents on every pound of cocoons grown, and fifty cents on every pound of silk reeled, is paid from the state treasury. The growing of silk has also been commenced in several towns in different parts of the state, and the experiments which have been made confirm the belief that the climate is no obstacle in the way of the silk grower; especially from the foliage of the Italian mulberry. In Newport, Fryeburg, Saco, Hiram, and Limington, nurseries have been planted, and are said to be in a flourishing condition, especially in the first mentioned town. This town is situated at about equi-distance between the Kennebec and Penobscot rivers, and within a few miles of the 45th degree of latitude; and yet the young plants withstood the severity of the last winter uninjured. A gentleman in Fryeburg has 10,000 or 12,000 Italian mulberries, four years old, and several thousand more in his nursery. He fed the last season 5,000 worms, which produced about the usual quantity of silk. His confidence is so strong in the success and profit of the business, that he intends to extend it as fast as his means will admit. About forty dollars worth of silk was made in Hiram the last season, and manufactured into sewing silk; the quality of which is said to be equal to the best Italian. A few pounds were also made in Limington of excellent quality.

In New Hampshire, the business has been begun, and is prosecuted with considerable spirit, though no public encouragement is given. At Concord, there is an incorporated company, with a capital of $75,000, for the growth and manufacture of silk. The company have purchased a farm of 250 acres, and are stocking it with both kinds of the mulberry as fast as circumstances permit. Individuals, also, in most parts of the state, are planting the mulberry, preparatory to feeding the worm. In the vicinity of Portsmouth many gentlemen are engaging in the business. Experiments have also been made in South Weare, Newport, Dunbarton, Warner, Hopkinton, Keene,

and many other towns; and the results have satisfied the experimenters that the business is both practicable and profitable.

The legislature of Vermont, by an act passed on the 10th of November, 1835, have authorized and directed the state treasurer to pay a bounty of ten cents on every pound of cocoons grown within the state. This bounty, and a good degree of interest which previously was awakened, has given the business a good beginning. In most parts of the state seed has been sown, trees planted, and small quantities of silk have been made. In Burlington, Brattleboro', Woodstock, Middleburg, Bennington, South Hero, Montpelier, Orwell, Shoreham, Guilford, Putney, and many other places, the subject is receiving attention, and preparations are making for operations on a large scale.

The legislation of Massachusetts, for the encouragement of the growth of silk, is of the most liberal character. The bounty on all silk grown, reeled, and throwed in the commonwealth, is $2 a pound, which is considered by silk growers to be sufficient to defray all expenses attending its growing, reeling, and throwing. Before the passage of this law, extensive nurseries and plantations were commenced or projected; but the business has since assumed a more general character. The interest which is felt in this state is attributable, in a great degree, to the efforts of Jonathan H. Cobb, Esq., of Dedham. This gentleman has been several years engaged in the business, and the success he has had has inspired others with confidence in it. There are several incorporated companies formed, some of which have commenced operations. Among them is the New England Silk Company, at Dedham, nuder the superintendence of Mr. Cobb. This company has a capital of $50,000, with liberty to extend it to $100,000. It has already about twenty acres planted with the mulberry, and about thirty more in preparation. In relation to the present state of the manufacturing department, Mr. Cobb says: "We have sixteen sewing silk machines, some of which have been in operation, and others are nearly completed for running. But a small quantity of sewing silk has been made as yet. We have found organzine and tram, or warp and filling, to be in greater demand than heretofore; but, in consequence of the 40 per cent. protection on sewing silk held out by government, we have been building a large mill this season, and are now about ready to manufacture 200 lbs. per week of sewing silk, which, at present prices, will fetch $2,000; and should the tariff remain, and the price keep up as it now is, we shall make a heavy business of it. About $10,000 worth of silk goods, part with a mixture of cotton, have been manufactured here the year past; about one-half from foreign, the rest from domestic silk. We shall continue to furnish, as we have in years past, the warp and filling for looms in different parts of the country. The Tuscan loom was first started here, and we have supplied many hundreds of them with warps, for two or three years past."

The Atlantic Silk Company, at Nantucket, has a capital of $40,000. The object of the company is the growth and manufacture of silk. The factory is already in operation, and the fabrics which have been made are highly creditable to the manufacturers. William H. Gardner, Esq., of Nantucket, is president of the company.

The Northampton Silk Company has a capital of $100,000, with liberty to extend it to $150,000, and is under the superintendence of Samuel Whitmarsh, Esq., who is also president. The object of the company is both the culture and manufacture of silk; and for this purpose, they have a plantation of about three hundred acres, and suitable buildings. The plantation is being stocked with the *morus multicaulis;* and another variety of Chinese mulberry, which, on many accounts, they think preferable. Their manufacture, at present, is principally confined to sewing silk, the quality of which is said, by competent judges, to be equal to the best Italian. The company have also imported large quantities of mulberry trees, with which they are stocking their own plantation, and in part supplying the great demand for that article.

The Massachusetts Silk Company has a capital of $150,000, and a plantation of 160 acres at Framingham. They have now growing 78,000 Italian, and 7,360 Chinese mulberry trees, besides a seed-bed of two acres. There are also in this state the Boston Silk Company, the Roxbury Silk Company, and the Newburyport Silk Company, all with large capitals. Besides these incorporated companies, individuals are engnging in the business, in most parts of the state, with very promising prospects.

In Rhode Island, where the manufacture of cotton has been long and profitably prosecuted, the manufacture of silk is commencing. There is one incorporated company by the name of the Valentine or Rhode Island Silk Company. This company has a capital of $100,000. The factory is in Providence, and the plantation in the neighborhood. It has been in operation some time, and has manufactured some very beautiful and durable articles.

In Connecticut, silk has been grown in considerable quantities for fifty or sixty years, particularly in the counties of Windham and Tolland. As an encouragement to the silk grower, the state pays a bounty of one dollar on every hundred Italian or Chinese mulberry trees, set out at such distances from each other as will best favor their full growth and the collection of their leaves, and cultivated until they are five years old. The state also pays a bounty of fifty cents on every pound of silk reeled on an improved reel.

There are two incorporated companies in the state—the Mansfield and the Connecticut silk manufacturing companies. The former is located at Mansfield, and has a capital of $20,000: the latter at Hartford, with a capital of $30,000. Both these companies have been beneficiaries of a bank. The business of the latter has hitherto been principally limited to the manufacture of Tuscan straw for ladies' bonnets; but it has lately commenced the manufacture of sewing silk in large quantities and of a good quality. There is also a small silk factory at Lisbon, which has been in operation for several years, and is said to be doing a good business.

Individuals, also, in all parts of the state, are engaging in the culture; several of whom are planting large tracts with the mulberry. The Messrs. Cheney, at Manchester, have been engaged the past season in cultivating the *morus multicaulis*, and have been very successful. They intend stocking a large plantation of this variety of the mulber-

ry, and prosecuting the growth of silk, and its manufacture into sewing silk and fabrics, on an extensive scale. Messrs. Brown and Lee, of East Granby, have also extensive grounds devoted to the cultivation of the tree. They sowed, the last season, 120 pounds of Italian mulberry seed, and have several millions of seedlings. They are also extensively engaged in the cultivation of the *morus multicaulis*. Their ultimate object is to unite the manufacture with the growth of silk. There are, also, extensive nurseries at Hartford, Suffield, Farmington, Litchfield, New London, Stonington, Durham, New Haven, and many other towns. Mr. Ephraim Cheesbrough, of New London, has invented a simple plan for making cocoons, which promises to be an improvement on the old method. Mr. Isaac G. Botsford, of Boxbury, has invented a machine for the manufacture of organzine, tram, and sewing silk, which is said to be an important improvement in silk machinery. The machine of Mr. Adam Brooks, of South Scituate, which has been some time in use, proves to be a valuable invention.

Middle States.

The subject of encouraging the culture of silk has been under consideration in New York for some time, and it is expected it will be given at the present session. Several silk companies have been incorporated; among which are, the Troy, Poughkeepsie, the New York, and the Albany silk growers companies. These companies have large capitals; but of their present condition I am not advised. Though the business is engaging the attention of gentlemen in most of the counties, yet my information is limited principally to those of Steuben, Broome, Lewis, Orleans, Monroe, Onondaga, and Suffolk. From these counties, communications have been received. In the county of Steuben, there are about 20,000 Italian mulberry trees of five years growth and under, and 1,200 Chinese, one and two years old. About twenty persons have commenced the business; one acre is devoted, and ten more in preparation.

In Broome county, little has as yet been done; but my correspondent says: "I have no doubt that in three years there will be 100,000 *morus multicaulis* trees in this county." In Lewis county there are a few trees of both kind, and one gentleman has 8,000 or 9,000 cuttings of the Chinese, ready for setting the coming spring. He says: "people are beginning to awake to the business, and believe it will flourish here." In Orleans county, there are about 600 of the Chinese, and 50,000 of the Italian, now growing. Seven pounds of sewing silk have been made, and seven or eight persons engaged in the business on a small scale. It is supposed $200,000 will be invested in the business in five years. In Monroe county, there are large nurseries, at Rochester, Greece, and several other places. In the town of Sweden, there are 4,125 Chinese mulberry trees of five years old and under, and about 100,000 Italian; five acres of land are already planted, and fifteen more in a state of preparation. In Onondaga county, there are many of the Italian. On Shelter island, there are 6,000 Chinese, and 100,000 Italian, and seven acres of land are in preparation. In Southampton, on Long Island, there 50,000 Italian and a few Chinese; two acres of land are stocked, and five preparing. A beginning has also been made in Montgomery county, and some beautiful sewing silk made.

The foregoing is a very imperfect view of the present state of the business in the great state of New York. In all parts of the state, individuals are engaging with spirit, and there is no doubt New York will become a great silk-growing district.

In New Jersey, several companies have been incorporated; among which are the New Jersey silk manufacturing company, with a capital not exceeding $30,000, and the Monmouth silk company. Several other companies are formed or projected, and enterprising individuals in many parts of the state are cultivating the mulberry, and, in some towns, small quantities of silk have been made. The soil and climate have been found well adapted to the business.

A number of companies have been formed in Pennsylvania, under a general law of the state for the encouragement of the culture of silk. The Beaver Silk Company, at Beaver Falls, in western Pennsylvania, is about commencing operations under very favorable circumstances. There is also a company in Chester county, and another recently formed in Philadelphia. At Economy, the Harmony Society have commenced the growth and manufacture of silk They have about 10,000 Italian trees, and 453 Chinese, of various ages.—They have manufactured sewing silk, vestings, cravats, &c., which are beautiful. Hundreds of farmers, mechanics, and professional men are also engaging in the business.

In Delaware and Maryland the subject is attracting much attraction. Several companies have been formed, and individuals are commencing plantations. A company has been incorporated in Queen Anne county, with a capital of $50,000, for the purpose of growing silk. The Talbot County Silk Company has also been incorporated.

Southern States.

In the southern, as well as in the northern and middle states, much interest is felt in the subject, and much is doing to introduce it to the attention of planters. In Virginia, they are proposing to devote their worn-out tobacco land to the culture of silk, in the hope of checking the tide of emigration, which is setting west and threatening to depopulate the country. There are several silk companies, and many patriotic individuals are making experiments. The Virginia Silk Company has been incorporated with a capital of $10,000—a very liberal charter. The Potomac Silk and Agricultural Company, with a capital of $5,000, and liberty to extend it to $50,000, has also been incorporated. The company have purchased 400 acres of land, and planted about 2,000 Chinese mulberry trees. Mr. J. B. Gray, near Fredericksburg, has also a large number of Chinese trees in a very flourishing condition.

The accounts I have received from North Carolina are of the most cheering character; they represent the soil and climate to be remarkably favorable to the growth of the tree and the rearing of the worm, and the planters are disposed to give the subject a fair trial. The same is substantially true as respects South Carolina and Georgia. Experiments have been made, the results of which

have satisfied many of the planters that the young, aged, and infirm portion of their slaves can be profitably employed in the culture of silk; and there is little doubt that in a short time many of them will make a silk as well as a cotton crop.

In Florida and Alabama the tree grows luxuriantly, and produdes an abundance of foliage. Experiments in rearing the worm have, also, been attended with favorable results; and a portion of the inhabitants are convinced that silk will be the most profitable crop they can make. At Pensacola and Mobile are large numbers of mulberry trees; and arrangements are making by several gentlemen to commence the business. At the latter place, Chester Root, Esq., is preparing for a large plantation. The black mulberry is indigenous, and its foliage has been found to make as good silk as that of the Italian or Chinese. It is also supposed the steril lands of West Florida will become valuable on account of their adaptation to the production of silk.

Western States.

The soil and climate of the western states has also been found to be peculiarly adapted to the silk culture; and many farmers and others are turning their attention to it. In Ohio, there are a number of companies incorporated, with large capitals, and under the direction of skilful managers. The Ohio Silk Company, at Columbus, has a large plantation on the rich bottoms of the Scioto, which is fast stocking with both kinds of the mulberry: 30,000 Italian, four years old, and a large number of the Chinese, have been set. The company propose to extend their plantation of Italian to at least one hundred acres, with one thousand trees to the acre, and an equal number of acres with the Chinese. It is also their intention to add about fifty acres in hedges of both kinds.

A company has also been formed at Mount Pleasant, in Jefferson county, with a capital of $50,000. The Massillon Manufacturing Company have had their capital extended to $600,000, and are determined to engage largely in the culture of silk. Several other companies have been formed, and many more have petitions before the Legislature for acts of incorporation. In the vicinity of Canton, in Starke county, seventy families are said to be engaged in making silk; and in Knox, Cuyahoga, Jefferson, Belmont, Washington, Brown, Hamilton, Montgomery, Highland, and several other counties, many individuals are beginning. Several petitions are now before the Legislature praying for public encouragement; and it is expected something liberal will be done.

In Kentucky, a company has been incorporated under the name of the "Campbell County Silk Culture and Manufacturing Company," and has selected a favorable location opposite Cincinnati. The subject is new in this state, but it is attracting attention, as is apparent from the following extract of a letter from a gentleman near Lexington: "The first talk of silk-raising in this country was about a year and a half since, when a friend sent me the first copy of the Silk Culturist. So great has been the increase of public sentiment, that there appear but few of the rich farmers but who are talking of it as a source of employment for their weak force. There are a great many Italian mulberries of one year's growth. I have near 100,000 in a nursery of five acres; and there is the produce of four pounds and a half of seed more, raised by five of my immediate neighbors; all of which will be planted out in the spring in hedge rows. I calculate there will be over one hundred acres planted. The six that are now making experiments are all rich, and can bring into the field one hundred and fifty hands of their own, and as much land as is necessary: and our whole energy will be turned to it."

In Indiana, large quantities of seed have been sown, and a spirit of inquiry has been awakened, particularly among the Quakers at Richmond. A gentleman of that place says: "There has nothing but the Italian been grown as yet, of which there is, to my knowledge, only about 30,000 trees, which are all seedlings. There will be some of the real Chinese, and also of the *multicaulis*, cultivated, though to a limited extent. The business cannot flourish with us till our trees have grown, though to a limited extent. The business cannot flourish with us till our trees have grown, though our woods abound with the black mulberry." There is a large nursery of both kinds at Madison, and the state will gradually be furnished with trees.

In Illinois, Michigan, Missouri, and Tennessee, small beginnings have been made, and the congeniality of the soil and climate cannot, ultimately, fail of making them great silk-growing states.

In looking at the vast amount of silk annually imported and consumed in this country, and the facilities it furnishes for its production, the conviction irresistibly forces itself upon the mind, that our national interest, independence, and respectability, loudly call for such legislative aid and encouragement as shall stimulate to activity and perseverance the efforts which are making to introduce its culture as a common branch of rural economy. Hitherto, the work has been carried forward by individual exertions; and this is unquestionably the true method, so far as individual interest is concerned. But the nation has a great interest involved in it; and it is its duty to foster it in such a manner as will afford it protection and encouragement. The public and individuals having a common interest in the object, may, by an energetic co-operation in effort, secure its benefits to both.

The efforts which have been made by individuals, and the success which has thus far attended them, seem to point out the course which should be adopted by Congress. Enough has been done already to enlighten the public, so far as its practicability and profit are concerned; and nothing more is wanting to induce thousands of the enterprising and industrious to engage in it, but a thorough knowledge of its details. Could a general diffusion of practical knowledge on the subject of cultivating the tree and rearing the worm, be effected, I have no doubt the United States would finally become one of the greatest silk-growing countries in the world. It is for the committee to recommend the measures which ought to be taken by Congress to promote this great object; and in their hands I leave it, with one suggestion: if a small and cheap manual on the subject could be extensively circulated at the public expense, I have no doubt it would be well received, and at the

same time, be the best method to accomplish the great object in view.

I am, sir, very respectfully,
Your obedient servant,
ANDREW T. JUDSON.

Hon. J. Q. Adams,
Chairman Committee on Manufactures.

For the Farmers' Register.

BRIDGES AND ABUTMENTS.

Wardsfork, Charlotte.

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From the Genesee Farmer.

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Extract of a letter from the Hon. James McCall, of Rushford, Allegany county, Pa.

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Last spring I sowed ten acres of wheat stubble, which was ploughed once in November, and the seed was harrowed in as early in the spring as the frost would permit; this will yield me twenty bushels per acre. I also sowed four acres, from which corn had been taken the year previous; and which will give me thirty bushels to the acre. As a continuation of my former experiments of sowing spring wheat on winter killed wheat, I sowed one bushel on some spots where winter wheat had been killed out by snow drifts, one-half of which at least, was picked up by the pigeons, yet the remainder produced sixteen bushels; and had I have sown all that was killed out of the piece of nine acres, it would have added to my crop fifty bushels more.

I am so well satisfied with my experience on this subject, that I would in all cases where wheat is badly winter killed, whether in spots, or generally, recommend to sow the ground in spring wheat, and harrow it as early as you are satisfied the old roots are dead. Harrowing lightly over wheat that is alive will not injure the roots at all, and the scattering winter wheat that grows up will produce no injurious effect. Between the two you are sure of a good crop; and besides, you keep out the land grass, weeds, and other foul stuff, such as cockle, chess, &c., which every farmer knows will spread on the unoccupied soil to a thousand fold.

Some of my best neighboring farmers have been, for a number of years, in the practice of preparing their ground intended for wheat, in the previous fall, and sowing their spring wheat, as stated above, as early as possible, and have uniformly succeeded in getting good crops.

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Yours, &c.
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Rushford, Nov. 12, 1836.

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the food for the worms they intend to keep, it is highly important that those who need information on the subject should receive such as will not lead them astray; and it is highly to be regretted that there should be any diversity of opinion among those who are looked to for advice. The business of feeding and managing silkworms, has been so long in practice within the scope of our knowledge, and is in itself so simple, that there is but little danger of adventurers being led far astray in it; especially, as they will generally commence with a small stock of worms; and if they err the first season, they will improve by it the next without much loss. But this is not the case with respect to the trees which are to furnish the food. If a proper selection be not made at first, or the trees are improperly managed, a serious loss of time and expense will be the inevitable consequence. The first point in this selection is established beyond all doubt, that the leaves of the mulberry tree are the only article known, or which are likely or necessary to be known, to be depended upon as food for silkworms. But the mulberry is a genus comprising many species; and the different species also exhibit distinct varieties, produced by artificial and accidental means. Among the different species are the white, the black, the red, and the *morus multicaulis*.

The silk business first found its way into Italy by obtaining the eggs secretly from China, and with them the seed of the white mulberry. This circumstance, no doubt, established the character of the white mulberry in that country as the only species proper for making silk; and a firm belief in this point, whether prejudice or not, came with the first attempts to introduce the business into this country, and has maintained its ground until very lately. But recent experiments made in different parts of the United States, sufficiently extensive, and sufficiently authenticated to establish the fact, have shown that several other species of the mulberry are as congenial to the taste, growth and health of the silkworms as the white, and that the worms fed on them produce as much silk, and for all that a common eye can discover, as beautiful and as useful.

The species called the *morus multicaulis* has lately found its was from China, by way of the Phillippine Islands, to the United States. This kind, it appears, was selected by the Chinese emigrants to those islands for their own use. It has no doubt been in use, for the purpose of feeding silkworms in China, from time immemorial, and there are pretty strong reasons to believe that it is a favorite in that country. The spirit of enterprise which the subject has now awakened, has also introduced several other species or varieties, all of which are, no doubt, good, and among the rest the Brussa mulberry, brought from Brussa, a city of Turkey, by Mr. Charles Rhind, late United States Consul at Odessa, and a gentleman well deserving the respect and gratitude of his country. Mr. Rhind was aware that the silk produced in the neighborhood of Brussa is of the first quality, and very naturally supposed it derived its excellence from the kind of mulberry it fed on; and in the true spirit of patriotism, seized upon the opportunity to introduce that kind to his own country.

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these cases have occurred in the most northerly parts of the United States. As respects its fitness, on account of the taste and health of the worms, we can have the evidence of every one, I believe, who has tried it since its first introduction. I have never heard of a dissenting opinion from any one who had fed with it. It would be needless here to introduce a catalogue of names, as I have already given many in the previous numbers of the 'Silkworm;' but enough can be given in support of all the above facts to establish any fact capable of being supported by human testimony.

With respect to the quality of the silk, the only evidence I can obtain from any credible source, is that it is finer and stronger in proportion to the size of the fibre. I have been able to obtain no evidence which could be relied on, upon either side of the question, from experiments in America; but from Europe, though many can be quoted, I will give but one—in a report on the subject, by M. Matthew Bonafoux, the disciple of Count Dandolo, and now director of the royal gardens at Turin, and probably the highest authority on any question respecting the growth of silk, of any man now living. He fed a number of worms on the leaves of the white mulberry, and an equal number on those of the *morus multicaulis*. Both finished in the same time. Of the cocoons produced by the white mulberry, it required 410 to the lb., of those of the *morus multicaulis*, 384. Each pound gave two ounces of silk of equal beauty; but in winding, not a thread of those fed on the *multicaulis* was broken, which was not the case with the other. These are but a brief selection of the evidences in favor of the Chinese mulberry; and what are those against it? A letter from a gentleman in Paris, who could have no (known) motive to misrepresent, and concurrent opinion of a transient man (a refugee or exile) from Italy.

And what are the evidences in favor of the fortunate rival of the *morus multicaulis?* Of its hardiness, we have no particular evidence, to give it the advantage over the other. It is a native of Brussa, which is in latitude 40, and sixty miles south from Constantinople, and in the neighborhood of Mount Olympus, which, being 7000 feet high, has snow on its top. But the Andes, which are nearly three times as high, do not make winter at their base. Mr. Ruggles has ten or twelve thousand trees growing, which have not been injured by the winter. There are several gentlemen who have many times that number of the *multicaulis* growing, as clear from injury. There were set last spring on the judge's farm, 100 of the Brussa and 50 of the *multicaulis*. The former were taken fresh from the ground, the latter came by the packet from Boston, and of course were exposed some weeks. Both, for aught I could see, were in equally good condition. Of the Brussa but one died, of the other I believe none. The *multicaulis* were cut down in the fall within six inches of the ground; the Brussa left standing. Both appear to be still equally alive, though the ground has frozen to an unparalleled depth: 1000 cuttings of the *multicaulis* were set, and about 300 of the Brussa. The *multicaulis* cuttings had lain all winter, and the Brussa were cut from the branches. The weather was extremely unfavorable. Only about 300 of the *multicaulis* lived, and 3 of the Brussa. I have yet discovered no characteristic marks between the Brussa and the white mulberry, except such as may have been made by location and by peculiar treatment.

With all possible deference therefore to the judge's superior talents, (though I believe he has not had any more experience in the growing of silk than I have) I must beg leave to appeal from his decision in this case to the future experience of the public; and I confidently trust that his generous spirit will not feel any displeasure at my performing what the situation I am in imperatively demands of me as a duty. I am confident that most of the different species of mulberry will produce good silk; and I was convinced, previously to the information received from Gen. Tallmadge, that the common black mulberry would produce a silk of a coarse strong fibre, probably superior to any other for sewing silk. But sewing silk is but the smallest item in the immense business of silk growing, and whether good or bad, our market will soon be glutted with it. We shall produce silk for all the various purposes, and that of the finest fibre will generally command the highest price. I believe also that nearly every species of mulberry will be found indigenous in this country; and if I am not enabled to show, in a short time, that the *morus multicaulis* is a native of our forests, I shall be much disappointed.—ED. SILKWORM.

From the American Farmer.

ENTOMOLOGY.

To the President of the Agricultural Society at Annapolis.

Cambridge, Md. March, 20, 1819.

Dear Sir.—I have long been impressed with the opinion, that no branch of science, perhaps, more deeply interests the practical farmer, than *Entomology*, and none is generally less regarded. The numerous class of insects that blast the most flattering prospects, are suffered yearly to repeat their ravages, without a serious effort to obviate the evil, and the vast varieties, so useful, are suffered to perish, from the want of knowledge to preserve them. To learn the natural history; to enquire into the habitudes of life; the characters, changes, and metamorphoses, of beings so important, are objects not so frivolous as they may appear to the ostentatious, but superficial observer; it is the only mode rational or practicable, whereby the propagation of the one, and the destruction of the other, may be accomplished.

With these views, I have made repeated experiments in *Entomology;* and one of the first objects that attracted my attention, was the worm that inhabits the corn, usually called the grub-worm. I had seen a paper on this subject, by Richard Peters, Esq. in which he represents its parent state to be the "*scarabœus volvens.*" This fact I doubted, as Mr. Peters had not himself witnessed the experiment reported by him, though he believed the fact, and proposed a remedy founded upon it: I doubted it, because I had seen the *scarabœus volvens*, in so small a state, as to be almost invisible to the naked eye; upon which the reasoning occurred, that the product of a crysalis so large, as must *necessarily* be that of a grub-worm, could not, by analogical inference, be as diminutive as the *scarabœus volvens* is frequently seen and known to be, and consequently, that Judge Peters was deceived. To come at the fact, I car-

ried into the field a large transparent bottle, which I half filled with earth; upon this earth I deposited about a dozen of the worms, which were then devouring the corn, and gave them corn blades to feed upon. In a few weeks, or less, perhaps, they disappeared; I searched the earth, and found them chrysalids, enveloped in balls of earth. A considerable time after, I again examined them, and found several of them matured, and extricated from their envelope; others, a soft and white *pupa*, with limbs more or less distinctly formed, in various states of progression, and exhibiting unequivocal proof of their origin, and of the impossibility of mistake or deception. These destructive animals belong to their order "*coleoptera*" of Linnæus having *crustaceaus elytra*, or wing cases, which shut together, and form a longitudinal suture down the back; they are about one quarter of an inch in length, of a shining jet black color, very quick and active in their movements, and are seen in vast numbers under wheat stacks and in wheat yards.

The brief history of this insect is, that its *larva*, or caterpillar, having fed upon the young corn, descends into the earth about the depth of four inches, where it assumes its state of *chrysalis*, in which it continues until the first of July, when it becomes metamorphosed into the *imago*, or parent, which in autumn, deposites its *ova* in the fields, to undergo a similar series of transitions, which is effected by the heat of the ensuing season.

The obvious preventive is fall or winter ploughing, at such a depth as will turn up and expose to the frost the *ova*, whereby they must perish.

To prove the efficacy of this method, in December 1836, a field which I designed for corn, was ploughed four or five inches deep; the following season, my neighbors' corn fields, as well as those of the county generally, were assailed and nearly ruined by this destructive worm, when mine was almost wholly exempt from their annoyance.

Another insect, the "*curculio*," of which there are nearly one hundred species, belonging also to the *coleopterous* order, commands, from its universal ravages, upon both the farmer and the fruiterer, the attention of every member of the community, who has it in his power to contribute, in the smallest measure, to the destruction of this ruthless foe to the wealth and luxury of man; which frustrates, by its concealed and wily movements, the most rational and well founded plans, executed by the most ardent and efficient energies of the human mind and body. Are we not inclined to exclaim, with the moral and philisophical Seneca, "*Natura quam te colimus inventi quoque.*" How repugnant to the proud feelings of man, to stoop to combat with this insignificant animalcule? How resistlesss are the ordinances of nature, which compel us, by acts so humiliating, to admire and adore that complex creation, whereby the great architect has been fit to enforce them!

I have made experiments on the *larvæ* of several species of *curculiones*, and have found the parents so nearly similar in *habitat*, metamorphoses, and most other circumstances, that one description will suffice for their whole history; at least of those which I have examined; and the only mark of idiocrasy in the tribes which I have observed, consist in their choice of a *nidus*; selecting, from their peculiarities in this respect alone, the cherry, the plum or the grain of corn, as their instinctive or innate propensities might incline them.

In a transparent bottle containing some earth, I deposited several cherries, in which were the *larvæ* of the *curculio*, that infest that fruit; in a few weeks, or rather as soon as the pulp of the fruit was consumed, which was at different periods, they retreated into the earth, where upon examination some time after, I found they had assumed the state of *chrysalis*, which shortly resulted in that of the *imago* or parent; the wings of the insects were not sufficient to accomplish a flight, but merely to assist its ascent of the body of a tree; from which circumstances, I was led to the following reflections and experiments to test their correctness:

That the remedy must be such as would act, physically, to wit—to interrupt the metamorphoses, by preventing the descent of the *larvæ* into the earth; to expose to the weather, the *pupa*, after its descent; or to intercept in its ascent of the body of the tree, the parent insect; or, chemically—by substances, known to be generally deleterious to that class of animals.

The fruit being the *nidus* of the *ovum*, and the earth the *habitat*, in which it is brought to maturity and makes its abode, and the *larva*, from its soft and delicate structure, incapable of travelling, or sustaining exposure; when the fruit containing the *larva* has fallen and is rotted and consumed by the insect, the *larva must* descend, by the most direct route from its original depository, the fruit, into the earth, its permanent abode, there to undergo the metamorphoses, which will bring it to maturity, and fit it for a new series of depredations, which is so secretly performed, that though myriads are employed, they are never executed in detecting their work of destructition, the deposite of their *ova*. Hence I concluded, that one of the most effectual preventives, would be paving with brick, stone, shells, or some other hard substance, impervious to the soft *larva*, a circular space round the fruit tree, as extensive as the fall of the fruit; by which it would be interrupted in its descent in the earth, and consequently perish; or that it might be accomplished, by turning up the earth under the tree to the same extent, and thereby exposing to the inclemency of the weather, the tender *pupa*, of which two methods, the former is to be preferred; because thereby you arrest the passage of the *larva* to maturity, and necessarily destroy it. The latter method, if not performed in time, may allow the perfection of the *imago*, and in this state it is unquestionably more hardy and capable of providing another habitation, as secure and comfortable as that of its first election. And by the experiments which I have made, its descent and maturity are at uncertain and unequal periods, which would make an insuperable difficulty, in point of time, for performing the operation; if before the descent, it would necessarily be useless; if after the maturity, equally so, for reasons given.

This view of the subject, has led me, repeatedly, to both experiments, which I have fairly and impartially made without the influence of any prejudice, which it might be presumed, my reasoning had connected with, or in favor of the former; the result was, the fruit with which I made the experiment that had been destroyed by *curculiones*, for many years, were in all cases, when I

paved or shelled, entirely exempt; in two cases only, when the earth under the tree was turned up, at different seasons, the fruit escaped injury, but from the number that failed, I was inclined to ascribe these two to causes accidental and extrinsic.

The third method proposed, viz: to intercept the parent in its ascent of the body of the tree, by various obstacles which the mind will readily suggest, and thereby prevent its deposit of *ova*, though I have made no experiments upon it, I conceive to be rational, and easily accomplished and with those species of *curculiones*, of which there are many, whose wings do not admit of flight, but assist them only in climbing, it would undoubtedly be effected.

The fourth remedy which I propose, of a chemical nature, I have made but partial experiments to establish, such as are not yet satisfactory or conclusive; when finished, it will give me pleasure to report them, if the result be successful, by a fair and candid detail of facts.

I fear, I have already trespassed on your patience, and will venture merely to notice the parent of a singular *larva*, which some years ago, very generally, throughout the state, as you no doubt remember, threatened to exterminate the whole vegetable creation, as far as it travelled; in whole districts, not a solitary blade of wheat, oats, or rye, nor a remnant escaped its voracious appetite, and the grass was swept, in this march, as if by a scorching fire. So formidable were the destructive multitudes, that fosses, abbatis, and parapets were constructed, to repel their advances, and the ditches were filled with their dead bodies. I deposited in bottles, with earth, several of these *larvæ*; they shortly went into *chrysalis*, and came out a fly of the *lepidopterous* order, precisely like the candle-fly, in all respects. This result, I report, because numerous as they were, and as much alarm as they occasioned, I have never seen a notice of a similar experiment; and it may, in case of a return of these hosts of enemies, afford a clew to their destruction. We at least are not averse to know something of an enemy, which has, and may again assail us with more disastrous ravages.

If, sir, the present communication shall have the effect of inciting to inquiry, on these interesting subjects, the enterprising and intelligent farmer—if the plan of research which I have ventured to suggest, shall afford him any assistance—if I have added one ray of light, whereby more may be obtained—my purpose is answered, and my most sanguine expectations fulfilled.

I have the honor to be, sir, your obedient servant,

Jos. E. Muse.

From the Philadelphia U. S. Gazette.

A PRAIRIE ON FIRE.

Leaving the scene of my extreme rambles in the far west, I proceeded over a beautiful rolling country designated on the maps as "Coteau Des Prairie," a ridge about 1000 feet above the River St. Peters, and reached this place, the American Fur Companies old trading post.

We have met with several adventures, and amongst the rest came near being roasted alive in a prairie fire. I have a mind to describe it to you. Pliny did not more gloriously in the crater of Visuvious, than your humble servant *might have done* in a prairie fire! It is worth travelling ten thousand miles to be an actor in a scene so sublime.

About an hour before sunset we spied a cloud of vapor in the direction we were travelling, rising gradually from the earth, and spreading itself to the right and left as far as the eye could reach.

It resembled at first a fog I have seen rise from that great waste the Pontine marshes, and pass off over the Mediterranean in light columns of a feathery form, until it was lost in a higher altitude of light. After a half hour's progress it acquired a greater density, and like a London smoke extended itself over the whole heavens. Suddenly the sun which had partially illuminated the sky, sank below the horizon over the rolling prairie country, in which we were travelling, and all the light became instantaneously transferred to the east, in these clouds which became brighter and were driving before the wind towards us.

Until then I had regarded it as a phenomenon of the atmosphere, but the glare of light increased fast, the air became heated and suffocating, as the wind bore it directly upon us. The Indians, who were far in advance, fell back and announced the prairie on fire, and that it was fast approaching us. At first there was a general consternation among the whole party. I was alarmed, and demanded through a half breed, who spoke a few words of Canadian French, what was to be done.

Our pioneer, the old chief "Whirling Thunder," gave instant orders for the whole party to form a line, which every one obeyed, galloping away to the right and left, and dismounting some ten or fifteen rods apart. In five minutes every one had struck a fire, and applied a torch to the tall dry grass of the prairie, which was soon borne before the wind with terrific fury, in the direction we had come from, snapping and flying into the air like small rockets. The glare and heat of the fire advancing in the other direction increased every moment; our horses became restive, snorting and exhibiting the greatest terror, as it came cracking and streaming in the air before the wind, which had increased to a perfect hurricane.

At this moment the fire we had kindled advanced slowly against the wind, and from which we were retreating to avoid the flames and heat.—The prairie over which it had passed, being but a sheet of flames, gradually diminishing, however, in brightness. Here we were between two fires, and both advancing towards us, though that against the wind was slower and less intense, but both extended to the right and left to an immense distance. The one before the wind we since ascertained to have been about 42 miles wide, and to have run a distance of 170 miles, crossing the streams by the force of the wind. This scene, in connection with the perilous situation in which we were placed, was grand beyond the power of description. Thousands of buffalo, deer, and wild fowl were bounding and flying in every direction around us, which, added to the noise of the element, sounded like the clashing encounter of hostile armies. I have stood within the convulsed crater of Vesuvius during a night eruption, and seen a thousand travellers and visiters flying with lighted torches gleaming in the distance, before

the fiery waves of a torrent of lava. I have seen the deep flood of the Niagara leap from its rocky height into the foaming abyss below; and the rushing avalanche tumble from the glaciers of the Alps, carrying desolation and dismay to the inhabitants of the valleys below—but to witness a vast prairie in the far, far west on fire, is a scene more grand and thrilling.

'Tis vain to draw a picture of this night on the prairie, when earth and air were one complete blaze of light—a perfect whirlwind of fire and flames, and the wild beasts were driven *en masse* from their hiding places.

The heat becoming intense, the old chief gave the signal for retreat, by a wild whoop which was echoed by the whole of the Indians, though half-lost amid the noise of the elements. It was instantly obeyed by all, forcing with much difficulty our horses through the conflagration we had kindled, and continuing to ride for about three miles at full speed, until we reached a high ridge where the grass had been light, and was soon consumed. In other places it was often from four to ten feet in height.

Here we encamped for the night amidst clouds of smoke, nearly suffocating, and which rose so thick as to shut out the glorious scene we had before witnessed, and how much more romantic to be between two fires, than east among the embers of *one*.

The following morning when the party were all mounted, on our *signal horses*, with smoky faces, dresses and blankets, there being but a shade of difference in the complexion between the white and red man, I could but laugh heartily at the exhibition as we galloped off in Indian file.

Never was a party better dressed for a carnival masquerade. There was something wild; a picturesque beauty, such images as we were under this smoky disguise, for the two first days, particularly while travelling over this wide desolation.—There was a peculiar adaption of looks to the brown burnt sod on our trail. This fire had swept through forest and field, consuming the young trees, and the few autumn flowers, which now stud the prairies; and I felt satisfied that we owed our lives to the resolution and coolness of the old chief, for I should have been burned to a modern mummy, had I not have been rescued by the foresight of "Old Whirling Thunder."

Yours, J. H. R.

THE MEANS OF MAKING LARGE QUANTITIES OF MANURE, AND THE PROPER MANNER OF APPLYING IT.

To the Editor of the Farmers' Register.

Philadelphia Co., Pa., April 24th, 1837.

Dear Sir—Being confined to the house by an awkward accident, carelessly treated, I know not that I can better employ my time and thoughts, than in endeavoring to contribute my mite for the Farmers' Register.

I am led to believe, from the tenor of many articles in late numbers of the Register, that an earnest desire for agricultural improvement is spreading amongst *some* of the farmers of the present day; and I hope suggestions made with a view to aiding that improvement, will be received in a kind spirit, (even should they occasionally bear hard upon some of the habits chosen or adopted, without a thought, by almost all,) although they may not in themselves be worth much, proceeding as they do from one who has seen much and practiced but little.

To ascertain the means of improvement, it is sometimes well to inquire into the cause of the great want of it, which is so generally acknowledged, being manifest in the impoverished condition of the land and many of its cultivators. That this condition is not generally and fairly attributable to the naturally steril character of our lands is, I think, obvious. That it cannot be attributed to our climate, I think equally obvious. For I can imagine that but few persons acquainted with agriculture and its products, would be willing to denounce our soil and climate. Then the cause must be sought elsewhere. May it not be found in ourselves? Is our farming founded on correct principles, and systematically pursued? I think not. Do we husband and judiciously apply all the means and sources of preserving and increasing the fertility of the soil? Obviously not. Do we practice strict economy, combined with a generous expenditure, in the management of our crops and lands? Do we not rob and impoverish the soil continually—carrying off all that we can in any way use, (and thinking our merits and prosperity great in proportion to the amount of cotton, tobacco, corn, grain, &c. carried off,) and neglecting, abusing and destroying, even by fire, all that we cannot, or imagine we cannot, use profitably? If the fault is not inherent in the soil and climate, it must rest with the cultivator. Let him study agriculture as it deserves to be studied. Let him appreciate its relation to the well being of society. Let him try to read nature aright—to understand the value and relation of things, and crops, and of their different parts to each other, and I think he will become a very different farmer and political economist, to the farmers and political economists of the day.

You have, amongst your correspondents, one at least, who is able to explain the principles on which improved agriculture must necessarily be based, and whose practice exhibits the general correctness of his views. Hoping that he may soon be enabled to renew his communications, and conscious of my own inability to explain principles fully, I shall content myself with endeavoring to explain some of the improved practices which have come under my observation.

All farmers are ready to acknowledge the efficacy and value of excrementitious matters combined with vegetable substances, commonly called manure, as one means of improvement. To make manure in large quantities, seems to the initiated to be the easiest thing imaginable; and yet how few farmers make more than a fourth part of what they ought to make, and how many not even that! I have seen from thirty to forty per cent. of a farm manured from the barn yards annually—although large quantities of hay, straw and grain, are sold; this is accomplished too, with comparatively little stock. The secret, and it is one well worth knowing, lies in carefully collecting all the refuse vegetable matter that is grown on the farm, and supplying the yards, in which the stock is kept, with it from time to time as it is wanted, not as collected, but as it is required—and in supplying the stock

with plenty of good food and water, in the yards, in preference to turning them out day and night, to seek food, and squander manure.

To show the care that is taken to collect materials for making manure, I will mention, that in a few weeks after the grain harvest, the stubbles are all carefully mown, and the stubble stuff is as carefully raked together and hauled to the vicinity of the yards, as is the hay or grain at their proper seasons. To facilitate the mowing, much pains is always taken in ploughing, harrowing, and rolling the land, to keep it even, and all stones or other obstructions are gathered and carried off. Again—the whole produce of the corn field is carried off; the stalks are cut even with the ground—not from eight to eighteen inches above it—and after husking, the stalks with their leaves and husks are tied in bundles and hauled under cover, where they are carefully preserved, and furnish, with turnips, capital winter food for cows—the leaves, husks, and small ends of the stalks being eaten, the rest making litter sufficient to keep the yards dry, and the cattle clean, except in very wet weather, when it is sometimes necessary to add a little straw, or stubble stuff. After shelling corn, the cobs are all conveyed to the yard to be incorporated in the manure. All manner of refuse vegetable matter from the garden, even to the trimmings of bushes, is also conveyed to the yards. In short, the greatest pains are taken to keep the yards at all times well littered, and to keep the horses, cows and pigs in the yard, as much as possible, with a plentiful supply of food. The result is. as above stated, from thirty to forty per cent. of the farm manured annually from the yards.

Now it has been, and I dare say will be again said, by way of objection, that corn stalks do not make good manure; that there is no substance in them; that it does not pay to take so much pains to collect the means of enriching land. Indeed! and how is all this known? Has it been tried? and if yes—I may ask, in the words of another—"What have you tried? How did you try it?"

I recollect well an instance of the perversity of farmers and others, in opposing, even by ridicule, a deviation from the general habits of a neighborhood—which I will relate for the purpose of showing how strong are the prejudices against corn stalks and cobs as a means of making manure. An intelligent farmer, wishing to make use of his knowledge of the resources of his farm for its own improvement, deviated from the custom of the neighborhood so far as to prefer making manure on his farm, to hauling it from a neighboring city—which was supposed to be the only available source of great improvement. His neighbors generally condemned his plan in advance. They said, "it will never do—corn stalk manure is good for nothing—he will never get his farm up in that way." When the quantity of manure made was urged on their attention, the reply was still "it will never do—its good for nothing." Indeed so much was said about Mr. ———'s folly, that his workmen became dissatisfied with their employment. In the course of a short time, the general improvement of the farm was so obvious, that the few believers began to call the attention of the croakers to the fact—and what think you was the reply? "Umph, look at the quantity of manure he puts on—any body could improve a farm if they *would* manure as much as he does"—forgetting their previous judgment as to the quality of the manure, and their predictions that it would never do.

Another instance is worthy of record. A young man, who had learnt the value of corn stalks, and the system of managing them economically, moved into a district chiefly inhabited by quakers. One of his neighbors happened to pass his corn field in the fall, when he was busy collecting the produce, and seeing him very particular in cutting off the stalks, he called out, "Friend M———, what is thee going to burn thy stalks at this time of the year for?" Mr. ———, replied, "I am not going to burn them at all, but to put them in the barn yard."—"Thee might as well save thyself the trouble; they will never make manure, and if thee puts them in thy yard, thee will never be able to get them out again. Thee might as well put so many faggots in thy barn yard; thee had better burn them, and manure thy land with the ashes." Such was the opinion and the advice of an old man, to a young one just setting out in life. Mr. ———, who, by the way, has earned for himself the reputation of a very good farmer, of course, paid no attention to his neighbor's advice, but put the stalks in the yards, as wanted, and in the spring hauled out valuable manure in large quantities. The same neighbor happened to pass by when he was hauling out the manure, and when Mr. ———, called his attention to the fact, that corn stalk manure could be hauled out of a yard, he was met with the assertions that it could never be spread, and that it was good for nothing.

You may think these anecdotes trifling and ridiculous, and so should I, did I not know how widespread and inveterate are the prejudices against any innovation on established customs—and did I not wish to meet at the threshold, similar objections, which may present themselves to the minds of many readers.

But I find that I have only explained in part the means of making barn yard manure, without sufficiently explaining the way of doing it. It is accomplished by keeping the stock of the farm as much as possible in the yards. At all seasons, winter and summer, the horses are kept in their yard, which is littered with straw, stubble stuff, chaff, corn cobs, &c. In winter, they are fed with hay, grain, turnips, and some times carrots. In summer, a supply of green food is always given; the grasses, luzerne, rye, corn, millet, &c., furnish it. Being loose in the yard, their droppings are mixed with, and absorbed by the vegetable substances with which they come in contact; and by their tramping, the mass is prevented from fermenting too much, and at the same time reduced nearly to the condition of short muck. A constant supply of water is provided in the yards. The horses, when they come in warm, are confined to the stable for a time, to get cool, before being allowed free access to it. They are also fed with grain in the stable—and sometimes, in very stormy wet weather in winter, they are kept up—at all other times, they generally are, and always ought to be, loose in the yard. The cows are allowed to graze a few hours daily for a few months in the year—they are yarded every afternoon, and kept in their yard all night, having a supply of green food, as above for the horses, given to them night and morning. The rest of the year they are confined to the yard, with turnips and corn, fodder, and occasionally potatoes, nubbins, a little corn meal,

&c., by way of variety—the corn stalks, as before mentioned, furnishing litter. The cows are chained to bins in the yard, when being fed or milked; at all other times they are loose in the yard, never being put into a stable unless it be for a week or so at the time of calving, and then more for the sake of quiet, and to keep the calf out of harm's way, than any thing else. It may be well to mention, incidentally, that the yards are provided with plenty of good shed room, that they are well sheltered from the prevailing winds, and have a favorable exposure. The pigs, of which only a few are kept, have the range of both the yards, and are fed with swill from the house and dairy, and in winter, with a few turnips. In summer, they come up to the rack about as regularly as the horses and cows, for their portion of green food. I neglected stating in the proper place, that the horse stable is always kept well littered, and the manure made in it is put into the yard, from time to time, where it is spread about.

Now, I believe that, if any farmer will pursue this plan steadily, and make good provision for it, he may make manure enough to improve a farm to the highest pitch, as far as manure alone is concerned; and not only do so, but find the amount of disposable produce greater, under such a system, than under that which usually prevails.

Having said so much about making manure, it may not be amiss to add a few words about applying it. Convenience, experience and reason, point to top-dressing on young grass as the best mode—above all, where land is already in good condition. It is convenient so to apply it, because it need not interfere with timely sowing and planting, which it generally does, when applied to wheat, corn, turnips, &c. It may be hauled out and spread in the fall and spring, when sowing and planting is interrupted, or finished. My own observation teaches me, that wonderful crops of grass and hay are produced by this application of manure. And one of the most intelligent farmers in England told me, that his experience showed that manure applied to wheat, on land in good condition, was more apt to injure than benefit the crop, particularly in its quality. This farmer, for a period of about forty years, has usually taken wheat of the very best quality to market—and, what may surprize some farmers, he told me, that for about thirty years he had not changed his seed. When I saw his crops, they were estimated at from thirty-five to forty bushels per acre, although the season was not a favorable one. His soil is not considered a good wheat soil. If the manner in which nature applies all animal, and a large portion of vegetable matter to the soil, be observed, it will not, I hope, be thought unreasonable in man, so to apply it. A friend of mine, calls top-dressing "the tea-system"—supposing the virtues of manure to be conveyed to the plant in infusion, or solution.

Some farmers may think that cows kept as above described, will not give much milk and butter. I can assure them that they do, and of excellent quality, with good dairy management; and that they keep in good condition too.

Some time since, I saw on the farm of one of my friends, what I thought to be an *improved practice*. He usually pays about twenty-five cents an acre more than any of his neighbors, for mowing grass for hay. He is very particular, in laying down his lands to grass, to have them evenly ploughed, harrowed and rolled—and every spring, he rolls his mowing ground with heavy iron rollers of large diameter—and stones, or other obstructions to the scythe, are removed. In mowing, he insists on narrow swaths being taken, and the scythe being kept close to the ground, and well pointed in and out. You will think this not the way for the mowers to make fast work. Hence the necessity for the extra twenty-five cents. My friend thinks that for every cent extra, that he pays for mowing, he receives about ten cents of value, in the increased weight of hay. He contends that the lowest inch of grass in his fields, yields as great a weight of hay as five or six inches at the top—and he has the satisfaction of having his work well done. I have seen on his farm, a field of forty acres, so neatly mowed, that it was exceedingly difficult to find which way the mowers had worked. Now, this, I think an improvement on the practice, so almost universal, of mowing in such a manner, as to leave each swath and each stroke of the scythe visible—I had almost said, to a passenger on a rail road car, going at the rate of fifteen miles an hour.

P. H.

IMPORTANT EXPERIMENTS WITH CANAL BOATS AT HIGH VELOCITIES.

We extract from the *Edinburgh Advertiser*, the annexed account of some experiments, which prove that high velocities are attained by properly constructed vessels, upon canals, or narrow waters without raising a great wave, and consequently injuring the banks:—

"We regard the experiments described below as extremely important. If the result is correctly stated, and if no counteracting disadvantage has escaped notice, we think these experiments may be said to have added a million of sterling to the value of canal property in Great Britain, since they must, at no distant period, add fifty or a hundred thousand pounds to the annual dividends.—Nothing can be more paradoxical or startling in appearance than this result; and yet our knowledge of the many unexpected truths in mechanical science which experiment has brought to light will not permit us to reject it as incredible. It is this:—*that the surge generated in a canal by the motion of a boat, and which is so destructive to the banks, in moderately rapid motion* (such as four or five miles an hour,) *ceases altogether when a high velocity is employed.* It is true the vessels were of a particular construction, but this is immaterial.—A boat six feet long and five feet wide, is capable of being extremely serviceable, both for the conveyance of goods and passengers; and if a boat can be safely and conveniently dragged at the rate of nine or ten miles an hour upon our canals, passengers by this species of conveyance will then be upon a level, as to speed, with those who travel per mail. The great recommendations of canal carriage at present are, its cheapness, and the liberty of locomotion which passengers enjoy. Its leading disadvantages is its slowness; and this is now felt more and more, when our stage coaches are touching a speed of ten miles an hour, which will soon be doubled on our railways. We have not technical skill enough to know what a gig-boat is; but we infer from the other particu-

lars stated, that it must be flat-bottomed in the cross section, pretty well curved upwards at stem and stern, and very light. With this form, the quicker it is moved, the less water it will draw. At a very high velocity, it will merely skim the water as it were; the displacement of the fluid will reach only a few inches down; and this circumstance, with the quick motion of the boat, causing a re-adjustment of the equilibrium of the water equally rapid, the necessary time will be wanting for the motion to propagate itself beyond the narrow zone of water which immediately encompasses the boat. Such is our hypothesis, supposing the fact to be stated. We have a strong impression, however, that the result depends chiefly on the form of the boat, and that a much greater depth than five feet will be no material disadvantage, except where the canal is extremely narrow.

"Some months ago, by the suggestion of Mr. William Houston, of Johnstone, the committee of management of the Ardrossan and Paisley canal were induced to make certain experiments for ascertaining the rate of the velocity, at which a light gig-boat might be propelled along that canal. The experiments were made with a gig-rowing boat of about thirty feet in length, constructed by Hunter, boat-builder, Brown street, Glasgow; and this boat, with ten men on board, was drawn along the Ardrossan and Paisly canal, in the space of less than ten minutes, without raising any surge or commotion on the water—the force employed being one horse, rode by a canal driver. No account of this trial has ever been given to the public, but it was so satisfactory as to induce the committee of the Ardrossan canal to contract with Mr. Wood, of Port-Glasgow, for a gig-shaped passage-boat, sixty feet in length, and five in breadth, fitted to carry from thirty-six to forty passengers. In the month of April last, a number of experiments were made in the Forth and Clyde canal with two gig-boats fixed together, constructed by Mr. Hunter, and thus forming what is called a twin-boat. The object of these trials was to ascertain the rate of speed at which vessels might be propelled along that canal, and the effect of a light double, or twin-boat, in giving that degree of steadiness which it was apprehended would be so much wanting in a light single boat. A statement of these experiments on the Forth and Clyde canal has already appeared in the newspapers, and the only fact therein mentioned, which it seems necessary to repeat here, is the remarkable circumstance, that the quicker the boats were propelled through the water, the less appearance there was of surge or waves on the sides of the canal. The result of the experiments was so satisfactory, that a twin-boat of a gig-shape, sixty feet in length, and nine feet broad, was built by Mr. Hunter, Brown street, Glasgow, and launched in the Forth and Clyde canal in the course of the following month.

"The single gig-shaped passage-boat contracted for by the Ardrossan canal committee, was launched at Port-Glasgow, on Wednesday, the 2d of June, and she was towed up to the Bromilaw, and thence carried to Port-Eglington the day following; and on Friday, the 4th of June, a trial, of which the following is an account, took place. The boat is sixty feet long, four feet six inches breadth of beam, and drew on an average, including a deep keel, ten inches when light:—

"From the great hurry in which this trial was made, it was done under many disadvantages. The boat started from Port-Eglington for Paisley a few minutes after one o'clock, with twenty persons on board, and the distance from Port-Eglington to Paisly being seven miles, was accomplished in one hour and seven minutes. The rider was ordered to start and proceed the first mile or so at a very moderate pace, but even at this moderate pace the wave raised in front of the boat was very considerable. A high wave was seen on the canal preceding the boat, about eighty or ninety feet in front, and in some cases further, and causing an overflow at the bridges and in the narrow parts of the canal. The surge or the cutting wave behind the boat was, however, comparatively slight, and, except the curves, would not have caused much injury to the canal banks. The horse was very much exhausted when he got to Paisly, though by no means so exhausted as he was about the middle of the journey, having sensibly recovered after the first four or five miles.

"Two post horses were hired there; and lighter towing lines being attached to the boat, it started again, on its return to Glasgow, with twenty-four persons on board, four of whom were boys, and arrived at Glasgow, a distance of seven miles, in forty-five minutes. The greatest speed attained during the journey, was two miles in eleven minutes. During this voyage the surge behind was entirely got quit of, even at the curves, where it was reduced to nothing; and there was no front wave except at the bridges. It appeared only at the bridges, and just as the boat was about to enter under the bridge, and disappeared as the stern of the boat cleared the bridge. *The quicker the boat went, the more entire was the disappeaance of all wave and surge*, except where the water escaped in the centre of the canal, and met in two very noisy and rapid currents from each side of the boat at rudder. This noise and rush of water was so great behind as to induce persons on board to look around expecting to see a great wave or surge on the banks of the canal, but on the banks there was hardly a ripple. The two rapid noisy currents seemed to be completely spent and exhausted by the shock of their concourse behind the boat. Here, therefore, there was no room to doubt the correctness of the reports of the Forth and Clyde canal experiments. It was not merely to be said, that the greater the speed the less surge or wave, but is demonstrated, that, *at a high rate of speed surge and wave were done away with altogether*. Unluckily, there was no dynamometer attached to the rope, so as to ascertain whether contrary to all theory, the strain or pull was not, equally with the wave, and the tugging labor of the two horses, lessened instead of increased, by the accelerated rate at which they drew the boat. There can be no doubt, however, that with one trained horse, properly attached, the distance could be done in a period under forty minutes. Contrary to expectation, Mr. Wood's boat was quite steady in the water, and by no means crank. It may be proper to mention that the Ardrossan canal is throughout very narrow; at the brigde, and many other places it is only nine feet broad. It has a great number of turns, and many of them very sudden."—*(Brit.) Mining Journal.*

From the London Magazine for 1746.

OBSERVATIONS IN SEVERAL VOYAGES AND TRAVELS IN AMERICA.

Some account of a voyage from New York to Sene-puxon in Maryland.

——— Not being able then, on account of the excessive severity of the season, and the depth o the snow, which was near four feet, to pursue our route by land, through the province of *Pennsylvania*, we took passage on board a sloop * of about seventy tons, bound to *Sene-puxon*, in *Maryland*, which is generally a run of three or four days, with the land close aboard, and a fine level shore.

* * * * * *

The vessel was our greatest grievance we soon found, being prodigiously foul, rotten, and leaky; and a pack of stupid planters, the crew, who never had been ten leagues from land since they were born, increased that misfortune. Unknowing all this, we went on board as gaily as we would have done into a packet-boat, and found the master in bed, which inconvenience we readily put up with, as the voyage was so short and safe, and, as he informed us, his mate was a very able mariner. Our complement then was, six hands belonging to the sloop, three passengers, and seven negro slaves; and after taking some necessary refreshments from town, we weighed and fell down under *Nurten* island, and might have taken the advantage of an immediate north-wester, to have put out to sea; but here there happened a great dispute between the captain and his strange associates, and in short they refused to run beyond *Sandy-hook* that night. It seems they had engaged to come this trip, and to be paid in the freight of such goods as they bought at *New York* for their plantation uses, and so were not absolutely under command; and were resolved to lie under the windward shore, to consume half an anchor of *New England* rum before they left the sight of *New York*. Rewards and menaces were of no service, so we even made a virtue of necessity, and wrapping ourselves in our bedding, slept quietly till next morning; but found when we arose, that two of our negroes had lost the use of their hands and feet by the frost (which was excessively severe) notwithstanding they were warmly clad, and had the free use of that necessary liquor (on these occasions) rum, in what quantity they pleased. * * * *

* * On the opposite shore of *Long-island*, all bleached with snow, appears the sad reverse of spring—the tuneful warblers but just, weakly, hop over the unfertile stubble, and raise themselves to complain, in mournful chirpings, of their forlorn condition; nor pour out those floods of harmony that erst awakened, with enlivening melody, the early swain. The whole prospect is as of a large desert, save that here and there the crawling fences * of the plantations, and the aspiring vapors of the humble cottages, shew the country to be inhabited; and some remains of the rich gifts of *Ceres*, unthoughtfully neglected by the husbandman, still betray the footsteps of vernal industry, and somewhat alleviate my wintry chagrin. At five in the evening, we were abreast of *Barnegat*, on the coast of *New Jersey*, and the next day, at noon, we opened *Delaware river*, *Cape Henlopen* bearing south-west about twelve miles, and had an expectancy of a prosperous voyage; when a contrary wind springing up, we found our sloop made nothing of playing to windward, nor answered her helm, and that she was so leaky that the common spelling at the pump would not keep her above water, so that two hands were constantly employed at that work, immediately, and without the least distinction of persons. It seems, that hoping to meet a speedy passage, they had neglected telling us of their making so much water; but now were fain to confess their folly, and implore our assistance. It was in vain to argue in such a case, and self-preservation excited us to use our best endeavors. All the next day we lost way prodigiously, and the cold bleak weather almost perished us: upon comparing our reckonings, we found ourselves above fifty leagues from the nearest land, which we judged to be the most southerly part of *New Jersey*. This last twenty-four hours we were drowned in an inundation of rain, which, however, nothing abated the wind, which blew with redoubled fury, and the irritated waves tossed us aloft and alow in a most frightful manner, considering the bad condition of our habitation, which had not a sound plank in her, and the water poured in upon us on all sides. The next morning opened, all wild and tempestuous as the last, and our distractions were increased, by three more of our people being taken violently ill of feverish disorders, occasioned by the perpetual watching, the incessant labor and the wet and cold they were constantly subject to; and still more so, by our hen-coop with our fowls, and two or three hogs, which were our only remaining flesh provisions, being washed overboard, and our lee gunnel almost all torn away. We were obliged to shift our loading and ballast on the other side, and from this time could keep no reckoning; but lay to, under our double-reefed main sail, expecting the worst that could befall us. In shifting the ballast we found one considerable leak, which I stopped as well as I could with an old salvage well payed with tallow, and over it nailed an old tin plate, which gave some little respite to the pump. We now began to think seriously of the danger we were involved in, and the death that seemed inevitable. We had no carpenter, nor one person that understood sea affairs by profession, of the whole crew left, and in short every thing was fallen into our hands; we were but two, and the negroes were all unable to move, the frost having so affected their limbs, as to call for present amputation; two of them be-

* The ports of America are filled with various kinds of vessels, not over common in very long voyages in Europe, where three mast vessels are generally used, as much on account of their better accommodations for living, as on account of the more tempestuous seas they trade in; for most commonly the coasts of America and the West-Indies are a very safe and pleasant navigation, and long voyages have been made in very small craft. Sloops and schooners are the general built they run upon, and they are very adroit in the contrivance of them, particularly at Bermudas, where they build prodigious numbers for sale. They have also galleys, settees, perriaguas, launches, &c., too many to mention. I cannot imagine the experienced sailor would ever choose to trust himself in any thing preferably to a three mast vessel; for as to sloops, for instance, it is plain you have but one dependence, and may be swallowed up before you can remedy your loss.

* Worm fences.

ing mortified to the knees and shoulders: and here, I must observe, that in general, they are the most awkward, ungain wretches, in cold weather, that can be met with, and if not stirred up, will sit whole days shivering in a corner without moving hand or foot: they seem to be formed only for the sultry climate they were born in, and those they are principally applied to the use of; though when inured to a cold one long, they bear it tolerably well.

* * * * * *

The deluges of rain wixed with the waves that continually broke over us, the howling blasts that rent our ears—the total darkness, were nothing to our internal misery. Delirious ravings on one side—expiring groans on another—and the calls of help, which we were unable to give, on another, quite distracted us. Bread, water, and rum, were all we had left; these were our provisions for the sick, these our only sustenance; and these decreasing so fast as to promise the addition of the greatest of all evils to those we already endured. Indeed, had our fowls been preserved, we could not have dressed them, we could keep no fire, and could find no cooks, and therefore we contented ourselves with bread dipped in rum for our patients, and a draught of water after it, and bread and water for ourselves. We forbore to see after the negroes, but nailed down the hatches, and left them to the mercy of Providence. We weakened apace, and had no retreat from the deck, but lashed ourselves to some part of the quarter-deck, and slept and watched by turns. Thus we weathered three more dismal days and nights, in the two last of which the wind shifted to the eastward, though without abating of its wonted fury. However, we made what way we could, in our present trim, every minute expecting to meet with destruction. We made, as far as we could guess, near eight knots an hour, not daring all these last twenty-four hours to direct our eyes to our distempered messmates in the cabin, some of whom we were pretty sure deceased in the morning. We shaped our course as near as possible, to run in with the next land, and the next morning made shift, one of us, weak as we were, to get up to the mast head. None can conceive, with what rapture we descryed it all abroad; but we could not tell where we had fallen in with it, as not having had an observation for a long time. The unexpected sight almost deprived us of our senses with very joy, and instantaneously, as it were, the wind died away, and a gentle breeze succeeded, that carried us smoothly to our mark. We opened a large inlet, which we stood in for, and safely came to anchor, in twelve fathom water, the bottom a fine sand mixed with small shells.

Thus then we found ourselves, to our excessive satisfaction, free from those dire apprehensions that had so long disturbed our minds, and those fatigues that had jaded our bodies, in this little, uncommonly difficult voyage. As soon as we had dropped anchor, we saw several flats * full of men, whom we perceived to be our countrymen; but how was our joy raised into admiration, when we were informed, that the place we were in, and had so miraculously lighted on, was *Ascateaque* inlet to *Sene-puxon!* We adored the goodness of providence, and returned unfeigned thanks for our deliverance; and now we had time to contemplate the beauties of the scene, and to indulge this new satisfaction. The bay we were in, was open to the sea on the eastward, and on every side else, landlocked. We could plainly now discover the cries of the industrious hind, tending his improving flock; and on every side, the lowing of kine, the bleating of the fleecy charge, and the neighing of the generous steed struck our ears; and we exchanged for this new music, the jargon of bellowing winds, the bursting rains, and the roaring thunder. The beach all glittering with conchous riches, and white as the driven snow, attracted our eyes on every side; the green marshes and savannahs, even of this time, appeared in fresh verdure; and the woods, from the great quantities of evergreens, seemed to wear a summer hue. Up the country, the creeks, whose meanders we could discern, formed to the fancy regular canals, rushing torrents, headlong cascades, and shining mirrors; but to moderate our satisfaction, and to take off from our too great and presumptuous exultation, on the larboard shore lay the melancholy wreck of a large *Bristol* man, which had stranded in this place some years before. It is impossible to describe the tortures this sight gave us, which indeed forced tears from our eyes, by comparison with what we had been like to suffer ourselves.

We now examined our cabin associates, and found only the inanimate remains of three of them. The others had some signs of life, and were conveyed on shore by the planters who visited us, and were their neighbors. A thousand times they lifted their eyes up with astonishment at our forlorn condition. Our negroes were our next concern, and here only two were found alive, and such a stench of putrefaction in the hold, as made it necessary to have recourse to the usual preservatives from infectious smells. Ourselves now were to be considered, and as soon as the relations of our owner came down to the sloop to take charge of her, we embarked in a flat for *Golden Quarter.* And now, as if our ability held out only so long as our necessity subsisted, we soon felt the bitter effects of our late troubles: frost-bitten from head to foot, and severely distracted from so long a privation of downy repose, we now were almost unable to move any thing but our deploring eyes—yet, misfortune on misfortune!—our barge ran aground about a mile from the sloop, at low water, eleven o'clock at night, and we were forced to lie open and exposed till the ensuing morning, she was loaden so deep; and then, with some difficulty, we hove her off the shelve: and this, in an extreme piercing frost, finished our disasters, and served almost to rob us entirely of the little life remaining.

Eastern Shore of Maryland.

Relieved from this distress, we pursued our little voyage of about fourteen miles, through the several creeks that convey you to *Golden Quarter;* and we were near twenty-four hours before we arrived there, occasioned by our frequent interruptions, or running upon the marshes, or oyster-banks, with which these streams are prodigiously replete. On every side, you might discern the settlements of the planters, with their industrious clearings, surrounded by the native woods of the country; whilst the distant curlings of the aspiring smoke, wantoning

* These are large flat-bottomed boats, capable of carrying some tons of goods, and used in the tobacco countries to unlade vessels with. They have also a kind of sloops, clumsily built, which may be called tobacco druggers, of seventy to eighty tons burden.

in the breeze, direct your eyes to the happy places of their residence, where they, generally blessed with innocence and chearfulness, a compliant consort, and a numerous race at their boards, enjoy a life much to be envied by courts and cities. We gathered a fruit, in our route, called a *parsimon*, of a very delicious taste, not unlike a *medlar*, though somewhat larger: I take it to be a very cooling fruit, and the settlers make use of prodigious quantities to sweeten a beer, which they brew of *cassena* and divers herbs, which is vastly wholesome. The *cassena* is a shrub, that has a small leaf, somewhat sharpish, and is so admired, when hot water is poured on it, that I imagine the importing of it to *England* is prohibited for fear of injuring the tea trade. At our arrival at our hosts, we were put to bed, and for several days attended with a tenderness and humanity that soon restored our healths, and our limbs to their proper function; when, being furnished with horses, we addressed ourselves to our first stage, which was about twenty miles distant from *Golden Quarter*, called *Snow-Hill. Golden Quarter* is a kind of straggling country village, but the inhabitants of that place and *Sena-puxon*, though poorer than some of their neighbors of *Maryland*, occasioned by the poverty of their soil, are a perfectly hospitable, sociable, and honest set of people, and abound in every necessary of life, and most of the conveniences. In short, they seem to repine only on three accounts, as all this side of the colony does: the one is the scarcity of strong liquors; another the extravagant dues to their clergy, whom they pay a pretty large quantity of tobacco yearly to, by way of tithe, for every head in their families; and the third, is their paying a larger quit-rent, which I think they do in *sterling* money, than any of their neighbors under the king's governors. These things the poorer sort feel pretty smartly. To be sure, the clergy ought to be supported in every country, independently and decently; and certainly they are an order of men that are entirely necessary, whilst they behave soberly and uprightly, to the well being of society, and seem no where more so than in these countries; but as I take it, there is little justice in a poor land-holder's being obliged to give him as great an offering as his opulent neighbor. But here, as in every other part of the world, the complaints are very much regulated by the pastor's behavior: you seldom hear any grumbling, when he is a kind, beneficent, humane, and regular man, that feels for, and endeavors to supply, both the mental distresses and wants, as well as the bodily ones, of the charge entrusted to him; who never, from a vanity of temper, or sour enthusiasm, or a vain ostentation of learning, puzzles and distracts his hearers, by leading them astray from the plain paths or meanings of Christianity, into the eternal labyrinths and intricate mazes of speculation and mystery; nor sets himself up for an infallible judge of every dispute, and the authoritative decider of every question; nor, to sum up the whole, *daubs and dresses religion* (as the poet says) *which is divinely pure, and simple from all arts, like a common mistress, the object of his fancy.* The rum they generally have from their stores, is the *New-England* sort, which has so confounded a gout, and has so much of the molasses twang, that it is really nauseous; and this held up to a very large price. Sometimes, indeed, an *European* vessel lands, to the gentlemen in the neighborhood, a cargo of another sort; which, however, never diffuses itself much to those beneath them. In other better settled parts of *Maryland*, indeed, as about *Annapolis*, and elsewhere, you hear of no complaints of this sort, as every thing is in the greatest plenty imaginable: So that what I am speaking of, relates principally to *Worcester* county and the parts adjacent, where the number of merchants or store-keepers is but small. You now and then meet with a cup of good cyder, in the season, here, though of a thin fretting kind. The beer they brew is excellent, which they make in great quantities, of *parsimons*, &c. or *molasses;* for few of them are come to malting their corn, of any kind, at which I was much surprised; as even the *Indian* grain, as I have found experimentally, will produce an wholesome and generous liquor. The meaner sort you find little else but water amongst, when their cyder is spent. *Mush* * and milk, or molasses, *homine*, † wild fowl, and fish, are their principal diet, whilst the water presented to you, by one of the barefooted family, in a copious calabash, ‡ with an innocent strain of good-breeding and heartiness, the cake baking upon the hearth, and the prodigious cleanliness of every thing around you, must needs put you in mind of the golden age, the times of ancient frugality and purity. All over the colony, an universal hospitality reigns; full tables and open doors, the kind salute, the generous detention speak somewhat like the old roast-beef ages of our forefathers, and would almost persuade one to think their shades were wafted into these regions, to enjoy, with greater extent, the reward of their virtues. § Prodigious numbers of planters are immensely rich, and I think one of them, at this time, numbers upon his lands near one thousand wretches, that tremble with submissive awe at his nod, besides white servants: their pastures blessed with increasing flocks, whilst their yards and closes boast hundreds of tame poultry, of every kind, and their husbandry is rewarded with crops equal to all their ambition or desires.

The planters in Maryland have been so used by the merchants, and so great a property has been made of them in their tobacco contracts, that a new face seems to be overspreading the country; and, like their more northern neighbors, they in great numbers have turned themselves to the raising of grain and live stock, of which they now begin to send great quantities to the West-Indies. And it is the blessing of this country and Virginia, and fits it extremely for the trade it carries on, that the planters can deliver their commodities at their

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* Made of Indian corn, or rice, pounded.

† Indian meal, pounded or ground with the husks, and fryed. Great homine has meat or fowl in it.

‡ The shell of a fruit so called. Some of them hold two quarts.

§ What is said here is most strictly true, for their manner of living is quite generous and open: strangers are sought after with greediness, as they pass the country, to be invited. Their breakfast tables have generally the cold remains of the former day, hashed or fricasseed; coffee, tea, chocolate, venison-pasty, punch, and beer, or cyder, upon one board: their dinner, good beef, veal, mutton, venison, turkeys and geese, wild and tame, fowls boiled and roasted; and perhaps somewhat more, as pies, puddings, &c. for dessert: suppers the same, with some small addition, and a good hearty cup to precede a bed of down: and this is the constant life they lead, and to this fare every comer is welcome.

own back-doors, as the whole colony is inter-flowed by the most noble navigable rivers in the world. However, this good property is attended with this ill consequence, that being so well seated at home, they have no ambition to fill a metropolis, and associate together: they require no *bourses*, or meetings about trade; a letter will bargain for them, and the general run of the market determines the price of the commodity. For this reason, the capitals, and other towns in these two colonies, are very slightly peopled, and very badly situated, and remarkable for little else than the residence of the governors, and the meeting of the three estates, governor, council, and assembly. The principal meetings of the country are at their court-houses, as they call them; which are their courts of justice, and where as much idle wrangling is on foot, often, as in any court in Westminster-Hall. The lawyers have an excellent time here, and if a man is a clever fellow, that way, it is a sure step to an estate. It is necessity that has driven the practitioners of the law hither, from Europe, and other parts of America, and I remember few that had not made it very well worth their while. Thus innocence and truth, white-robed innocence and heavenly truth, can seldom find a retreat to dwell in. Distracted with their adversaries barefaced attempts, it is in vain they seek the most distant skies: pale-visaged guilt, and wily fraud, still pursue their flowery steps, determined to spare no means to work their unhappiness.

Wherever you travel in Maryland (as also in Virginia and Carolina) your ears are constantly astonished at the number of colonels, majors, and captains, that you hear mentioned: in short, the whole country seems at first to you a retreat of heroes; but alas! to behold the musters of their militia, would induce a man to nauseate a sash, and hold a sword, for ever, in derision. Diversity of weapons and dresses, unsizeableness of the men, and want of the least grain of discipline in their officers or them, make the whole scene little better than Dryden has expressed it:——

> And raw in fields the rude militia swarms;
> Mouths without hands, maintain'd at vast expense,
> In peace a charge, in war a weak defence:
> Stout, once a year, they march a blust'ring band,
> And ever, but in times of need, at hand;
> Of seeming arms, they make a short essay,
> Then hasten to get drunk, the bus'ness of the day.

Indeed, now, I fancy the Carthagening regiment, by returning some of its veterans, will give a better face to these matters.

Holding land by the tenure of defending it, seems to be as ancient as time itself; and certainly nothing can endanger a country more, than an army of mercenaries, who perhaps are quite unconcerned in the public property, and have nothing to fight for but their pay. How necessary then is it, that the militia in these colonies should be well disciplined! since they have no regular troops allowed them, and cannot well maintain a considerable body long themselves. Even at this time they are alarmed with an Indian excursion, and numbers are marched towards the back of the province to defend the outsettlements. Their government is much respected by them, and one may, on the whole, say, they are an happy people. The negroes live as easily as in any other part of America, and at set times have a pretty deal of liberty in their quarters, * as they are called. The argument of the reasonableness and legality, according to nature, of the slave-trade, has been so well handled on the negative side of the question, that there remains little for an author to say on that head; and that captives taken in war, are the property of the captor, as to life and person, as was the custom amongst the Spartans, who, like the Americans, perpetuated a race of slaves, by marrying them to one another, I think, has been fully disproved: but allowing some justice in, or, at least, a great deal of necessity for, making slaves of this sable part of the species, surely, I think, Christianity, gratitude, or, at least, good policy, is concerned in using them well, and in abridging them, instead of giving them encouragement, of several brutal and scandalous customs, that are too much practiced: such is the giving them a number of wives, or, in short, setting them up for stallions to a whole neighborhood; when it has been proved, I think, unexceptionably, that polygamy rather destroys than multiplies the species; of which we have also living proofs under the eastern tyrants, and amongst the natives of America; so that it can in no manner answer the end; and were these masters to calculate, they would find a regular procreation would make them greater gainers. A sad consequence of this practice is, that their children's morals are debauched by the frequency of such sights, as only fit them to become the masters of slaves. This is one bad custom amongst many others; but as to their general usage of them, it is monstrous and shocking. To be sure, a *new negro*, † if he must be broke, either from obstinacy, or, which I am more apt to suppose, from the greatness of soul, will require more hard discipline than a young spaniel: you would really be surprised at their perverseness; let an hundred men shew him how to hoe, or drive a wheelbarrow, he will still take the one by the bottom, and the other by the wheel; and they often die before they can be conquered. They are, no doubt, very great thieves, but this may flow from their unhappy, indigent circumstances, and not from a natural bent; and when they have robbed, you may lash them hours before they will confess the fact. However, were they not to look upon every white man as their tormentor; were a slight fault to be pardoned now and then; were their masters, and those adamantine-hearted overseers, to exercise a little more persuasion, complacency, tenderness and humanity towards them, it might, perhaps, improve their tempers to a greater degree of tractability. Such masters, and such overseers, Maryland may with justice boast; and Mr. Bull, the late lieutenant governor of Carolina,

* A negro quarter, is a number of huts or hovels, built at some distance from the mansion-house; where the negroes reside with their wives and families, and cultivate, at vacant times, the little spots allowed them. They are, indeed, true pictures of slavery, which begets indolence and nastiness.

† A negro just purchased from the Guinea-man. It is really shocking to be present at a mart of this sort; where the buyers handle them as the butchers do beasts in Smithfield, to see if they are proof in cod, flank, and shoulders. And the women, who have plantations, I have seen mighty busy in examining the limbs, size, and abilities of their intended purchases. I do not speak this of Maryland; for I never saw a lady at market there, but have elsewhere in America.

is an instance, amongst many, of the same, in that province. But, on the contrary, I remember an instance of a late sea officer, then resident in a neighboring colony, that for a mere peccadillo, ordered his slave to be tied up, and for a whole hour diverted himself with the wretches groans; struck at the mournful sound, with a friend, I hastened to the noise, where the brute was beginning a new scene of barbarity, and belabored the creature so long with a large cane, his overseer being tired with the cowskin, * that he remained without sense and motion. Happily he recovered, but, alas! remained a spectacle of horror to his death; his master deceased soon after, and, perhaps, may meet him, *where the wicked cease from troubling, and the weary be at rest:* where, as our immortal Pope sings,

No fiends torment, no christians thirst for gold.

* * * * * *

The convicts that are transported here sometimes prove very worthy creatures, and entirely forsake their former follies; but the trade has for some time run in another channel; and so many volunteer servants come over, especially Irish, that the other is a commodity pretty much blown upon. Several of the best planters, or their ancestors, have in the two colonies, been originally of the convict-class, and therefore, are much to be praised and esteemed for forsaking their old courses: and heaven itself, we are told, *rejoices more over one sinner that repenteth, than over ninety and nine that never went astray.* They tell many stories of some of these people in these colonies, one of which I commit to writing, as I had it from the very person himself, who is the chief in the story.

About sixty years ago, Capt. ———, master of ———, walking through Lincoln's-Inn-Felds, beheld a very pretty child, about six years of age, bewailing himself for the loss of his father, whom he had some how or other strayed from: he soothed the child, persuaded him to dry his tears, and told him he had orders from his father, who was just set out for the country, to bring him to him. The innocent victim, without thought of harm, followed his deliverer, as he thought him, who carried him in the stage coach to Bristol, and there immediately put him on board his vessel, which sailed a fortnight after for this part of the world. Still fed up with hopes of seeing his father, and that he was going but a small trip by water, where he was, and indulged by the captain, in all he desired, the time slipt away, till the brute made appear, by the vilest actions, his accursed design: The lad suffered much, but his innocence rendered him incapable to judge of the propriety of such actions, and he was acquiescent. When he arrived at the end of his voyage, being very ill, he sold him to a planter for fourteen years, for twelve guineas. The planter, a man of great humanity, taking a fancy to the child, heard his simple tale, and perceived the villany, but not till the vessel had sailed. He inquired his name, and just so much he could tell him, and sent over to advertise him in the public papers; but before this design could be completed, near two years elapsed, from his first being kidnapped, when, probably, his father and mother were both dead, and, perhaps, the cause of their death, this accident. In short, his master liked the youth more and more, who was sober and dilligent, and married him to an only daughter, leaving him at his decease his whole substance. Thirty years elapsed, and though under great pain for his ignorance of his parents, yet happy in his family and affairs, he lived with great content; when a ship with convicts coming in, he went to purchase some servants, and the idea of his barbarous captain was so impressed in his mind, that he knew him at first sight, and bought him eagerly; it appearing, afterwards, a notorious crime had brought him into those circumstances, and entirely ruined him. As soon as he brought him home, he carried him into a private room, and locked himself in with him; but what words could express the wretches confusion and astonishment, when he understood whose hands he had fallen into! for he had no notion before of the gentleman's being the same, that, when a lad, he had used so vilely. Struck with remorse, and the fear of punishment, he fell on his knees and begged forgiveness. It was in vain, he was interrogated about his master's parents; he knew as little of them as himself; the master enraged, ordered him to be locked into an upper room, resolving to keep him to the hard service he deserved the remainder of his life; but the next morning he was found stabbed to the heart, with a knife that had been incautiously left in the room; and so despairingly finished a wretched life. The gentleman is now near seventy, and very hearty and well.

* * * * * *

[*To be continued.*]

* A cowskin is so called, from being a large thong from the hide of that animal, twisted into the shape of a Swish horse-whip, and as hard as a bull's ——. The common method is to tie them up by the hands to the branch of a tree, so that their toes can hardly touch the ground; but in the West-Indies, they are so habituated to ill-usage, and their spirits so sunk, that the overseer need only bid them cast up their arms over their heads, which the poor creatures readily do, and then the torturer taking a run to him, lashes him; and this discipline is repeated sometimes forty times: hardly a negro but bears the marks of punishment in large scars on his back and sides.

INTRODUCTION OF TURNIP HUSBANDRY IN ENGLAND.

A correspondent of the Boston Courier, speaking of the introduction of the sugar beet into this country, makes some forcible remarks on the prodigious impulse which the prosperity of a nation may receive by the introduction of a single new plant, which he illustrates by the following historical fact:—

In an early part of the reign of George the First, the culture of the turnip was limited, in England to a few gardens, as that of the beet now is with us, and used almost exclusively for culinary purposes. That monarch, in one of his visits to his electorate of Hanover, was attended by his secretary of state, Lord Townsend; whilst residing there, this nobleman was struck by the appearance of extensive fields devoted to the culture of turnips, as food for cattle and sheep; impressed with the belief that this method might be introduced with advantage into his own country, he, before leaving Germany, took care to provide himself with seed, and, on his return, earnestly recommended to his tenants a practice, which, in Hanover had been found to produce the most favorable results. His wishes

were attended to, and the experiment surpassed, in success, his most sanguine expectations. The field culture of the turnip spread rapidly through the county of Norfolk, which, from that epoch, dates its high reputation as an agricultural district. Lands, which rented for one or two shillings an acre, soon brought fifteen or twenty, and steril warrens, on which were only to be seen a few half-starved rabbits, were reclaimed, and are now covered with rich harvests of grain. Colquhoun, in his statistical researches, computes that the annual value of a crop of turnips *in Norfolk* alone, amounts to not less than fifteen millions sterling! When it is considered that this root has been the means of bringing under culture, lands, which, without it, must have remained valueless; that it leaves the soil in a condition to ensure a good crop of grain or grass, and that the latter is a good preparation for wheat, we may safely consider the benefits resulting to England from the turnip culture as incalculable. If it was now asked, says Colquhoun, who was the man, in modern times, who had rendered England the most signal service, no one should hesitate to say, that it was the nobleman whom shallow courtiers nicknamed, in derision, "Turnip Townsend." In half a century the turnips spread over the three kingdoms, and their yearly value, at this day, says the same author, is not inferior in amount to the interest of the national debt!!!

For the Farmer's Register.

HEDGES—OSAGE ORANGE.

Hitherto, attempts to construct live fences in this country have mostly failed, in consequence of the want of adaptation in the material to the circumstances of soil and climate. The thorn flourishes well in the humid climate of England, but in our hot and dry seasons its growth becomes feeble and stunted. The cedar and some other plants, though very ornamental, constitute weak barriers against the inroads of stock.

So many unsuccessful attempts to grow hedges, especially in the states north of us, have induced a general prejudice against that species of enclosure. Every person, however, is disposed to admit, that if a suitable plant for the purpose could be introduced, it would be an important acquisition. At present, each farm is obliged to have from a fifth to a third of its contents in timber, in order to maintain its enclosures. If efficient hedges could be substituted, the advantages would be obvious. A large portion of good land, now unproductive, might be brought into cultivation; and a great amount of labor might be saved, which we are now compelled to bestow on the present system of fencing—to say nothing of the improvement in the rural appearance of the country, which would be effected by doing away our unsightly log fences, and rearing hedges in their places.

It is gratifying, therefore, to be assured, that in one of our native plants; namely, the *maclura* or Osage orange, we are likely to realize this desirable object. The maclura is a deciduous tree, growing indigenously in Arkansas and Louisiana —is perfectly hardy in this latitude, and even as far north as Boston. For a number of years it has been cultivated in the grounds of a few private gentlemen, and in some of the large nurseries. It is only recently, however, that its value has been appreciated, or any pains taken to propagate it extensively. In its native *habitat*, it attains to the size of a tree of the second or third class; but in this latitude, its altitude is very moderate, seldom rising to the height of fifteen feet. Its great merit consists in the spreading manner of its growth, the denseness of its branches, and the armature with which they are furnished. Planted in hedge-rows, the maclura would never become unmanageable on account of its size—at the same time, its growth is sufficiently vigorous to make a fence in three, four, or at most, five years, from the seed. It may be asserted with safety, that on land of tolerable fertility, the labor and expense of perfecting a system of hedges, would not be greater than to keep our ordinary enclosures in good order, for the time required to construct them. When completed, this heavy item in every farmer's account would thenceforth be expunged.

The maclura is readily raised from the seed. Unlike those of the thorn, they require no preparation—on the contrary, they vegetate with certainty in two or three weeks after planting. Under tolerable care, the seedlings will grow two feet or more in height the first season; after which, they are fit to be removed from the nursery rows to the place designed for the hedge. I raised a number of plants the past year from seeds, the produce of a tree growing in my garden, now eight or nine years old.

For an individual to engage in the business in earnest, it would be best for him to obtain the seed from the south-west, rather than to purchase the plants from a nurseryman. A few dollars would procure enough of the former, and pay all the expenses of transportation, to set a long line of hedge. The preferable mode would be to have them brought in the berries, from which they might afterwards be picked without much trouble. Fifty berries would yield at least a pound of seed, and a pound contains from eight to ten thousand grains. It is the practice to place the sets from twelve to fifteen inches apart, in a single row. These facts will enable any person to form a correct judgment of the number necessary to plant any given length of hedge.

But it is not to be expected, whatever may be the adaptation of any plant to the purpose of hedging, that it will, under a long time, be brought into general use. The most palpable improvements are slow in being adopted. A considerable portion of our country is moreover too much impoverished to admit of the successful rearing of hedges. They belong eminently to a state of cultivation where taste and industry are measurably combined. But if we have worn-out fields, we have also fine districts of country, where their pleasing effects, as well as utility, would be most manifest. What an air of neatness and improvement they would impart to the finely cultivated farms on James river, both above and below Richmond, to those also on the Rappahannock, the Roanoke, and in many other sections of the state that might be designated with equal propriety. In most of these places, the lands are so valuable that there is now a great deficiency of timber; and, from necessity, they are therefore almost exclusively devoted to grain. Along the lines of canals also, where permanent fences are obliged to be maintained, there would be a great advantage in plant-

ing hedges at once. The idea that when fairly established, they will never noed removal, would inspire a degree of security which cannot be felt by those persons who are in the habit of patching up decayed fences, and calculating the value of a rail in resisting the depredations of stock.

T. S. PLEASANTS.

Goochland county, Va.

From the (Brit.) Mining Journal.

A NEW CONSTRUCTION OF RAILWAYS.

Mr. Perkins has just exhibited a new plan of railways, which he has secured by patent, and which from the explanation given by him, would appear calculated to supply the desideratum so long desired, and indeed appears to form an era in the progress of those great national undertakings towards perfection. The plan embraces two modes of construction, founded on one common principle, viz: the continuous support of the rails. In the one case this is effected by blocks of vitrified earth, as hard and durable as granite, and which lock into one another, being laid on a concrete foundation; and in the other, by an additional depth of concrete supplying the place of sleepers altogether. Upon the former plan, wooden bearers, four inches in the base, four thick, two wide, on the top, rest upon the vitrified blocks; and in the latter, upon the concrete, to which they are firmly secured. In both cases, iron bars, with the means afforded for expansion and contraction, are fixed on the wooden beams, and the foundation being continuous and solid, in fact like one block of granite the whole length of the road, no vibration is felt, as the numerous persons who rode in the wagon unanimously testified; and this is an important attainment in railway constructions. The saving by the plan first described will, it is stated, be full £4000 per mile, in four rows; and by the letter, very much more—in fact, so enormous will it be, as to give a new feature to railways, and astonishingly facilitate their construction in all parts of the country. We should much like to see it in practice, which is alone the test: so fallacious are frequently found to the results when based alone on novelty and experiments.

For the Farmers' Register.

THE BLACK WEEVIL.

It is your own adage, that short articles, for the Register, are of most value; and adopting your opinion for the occasion, I send you one of that character.

For several years, I sustained much mischief in my wheat, by the black weevil; but until I read Mr. Webb's communication to the Register, I was ignorant that it had extended its ravages into Virginia, and North and South Carolina. I do not doubt the efficacy of Mr. Webb's remedy. Mine costs less money and trouble. When my granaries are cleared of grain, I, once a year, burn in them half a pound of pounded sulphur, closing doors and windows. For safety, I make a bed of sand on the floor, in which I put the sulphur in a stone, or earthen pan. Antecedent to this practice, I had sustained serious mischief from the black weevil; since, I have never seen one in my granaries.

Some of your correspondents insist, and I think you concur in the opinion, that proper names to articles would give increased value to the Register. To this, I do not entirely agree. I suppose you have no correspondents who do not trust you with their names; and though no one would consider you responsible for erroneous theories, I have deemed you responsible for the truth of facts. If proper names were required, it would cut off some beneficial communications. There are a class of men, who have no inclination to see their names in print. There are others, who, not having entire confidence in the purity of their style, and the correctness of their orthography, would be unwilling to subject themselves to the scourge of Doctor Syntax, a gentleman, who held, I believe, a residence in Virginia. The love of writing is a dangerous thing. I have known some half witted, half educated gentlemen, in Maryland, who would have got on tolerably well, but for their unhappy propensity to scribling over their proper names. Modesty is the crown of many virtues, in which patriots, from the days of Ciccero, to the present, have been sadly deficient. Being a retired farmer, and not a patriot of the current stamp, I have no disposition to blazon my name as the conqueror of the black weevil, but I do require that Virginians, North and South Carolinians, and all others, who, with my arms, shall subdue this pestilent enemy, to make their acknowledgments in the Register, that they owe the victory to a farmer of

THE EASTERN SHORE OF MARYLAND.

April 17th, 1837.

From the Richmond Enquirer.

ENACTMENTS DURING THE LAST SESSION OF THE LEGISLATURE OF VIRGINIA, AIDING CANALS, RAILWAYS, ROADS, &c.

The applications to the legislature for the incorporation of companies for works of internal improvement, were during the late session uncommonly numerous, and embraced works of importance in every section of the state. The demands on the commonwealth for subscriptions to the stock of companies formerly chartered, whose three-fifths of individual stock had been subscribed, were also numerous; and the evidences of a liberal policy will be seen in the numerous appropriations made for objects of this description, of which the following is a list:

Commonwealth's subscription to the stock of the Richmond and Petersburg Rail Road Company,	$200,000
To the stock of the Louisa Rail Road Company,	120,000
To the new stock of the Upper Appomattox Company,	27,700
To the stock of the Natural Bridge Turnpike Company,	3,200
To the augmented stock of the Portsmouth and Roanoke Rail Road Company	50,000
To the augmented stock of the Dismal Swamp Canal Company,	126,000
To the stock of the Falmouth and Alexandria Rail Road Company,	400,000
To the stock of the Lynchburg and Tennessee Rail Road Company,	200,000
To the stock of the City Point Rail Road Company,	60,000

To the stock of the New Shenandoah Company,	46,666
A further subscription to the stock of the Rivanna Navigation Company,	10,000
To the stock of the Baltimore and Ohio Rail Road Company (to construct the portion of the road running through Virginia,)	302,100
To the stock of the James River and Kanawha Company,	1,990,800
To the stock of the Roanoke, Danville and Junction Rail Road Company, the state subscribes two-fifths of the whole capital, ($800,000;) the state's subscription to be paid in the ratio of individual subscriptions which may have been made on the 1st of April, 1839.	
To stock in the Little Stone Gap Turnpike Company,	2,000
To stock in the Red and Blue Sulphur Springs Turnpike Company,	5,000
To stock in the Lewisburg and Blue Sulphur Turnpike Company,	1,000
The following are direct appropriations not founded upon the two-fifths principle:	
For the repair of the Cartersville Bridge,	1,700
For a road from Nicholas Court House to Gauley Bridge,	1,500
For a road from Price's Turnpike to Cumberland Gap,	60,000
For the repair of the road over Middle and Peters' Mountains,	1,050
For the construction and macadamizing of a portion of the North Western Turnpike,	65,000
For a road from Sistersville to the North Western Turnpike,	6,000
For a road from Western (Lewis county) to Charleston in Kanawha,	6,000
For a road from Ice's Ferry, on Cheat River, to the Pennsylvania line,	2,800
For a road the from Pennsylvania line to the Beverly and Clarksburg road,	18,000
For completing a road from Staunton to the mouth of the Little Kanawha,	1,600
[In the three last improvements, the the counties are to raise a proportion of the estimated cost of the works.]	
For the repair of a road from Logan county to the Kanawha Salines,	1,050
For a road from the Pound Gap to the Fincastle and Cumberland Gap road,	50,000
For improving the navigation of the South Branch of the Potomac River,	2,000

The appropriations for the above mentioned improvements, and other contingent demands, will probably swell the obligations incurred by the state during the recent session of the legislature to an amount considerably above four millions of dollars. The income of the fund for internal improvement is absorbed by the interest on former loans: But the state has entered upon this enlarged course of policy with boldness, and there is no doubt that the good work will proceed. An act was passed with a view to this object at the close of the session, which appropriates the interest on the surplus revenue, on deposite in the banks, for the payment of the interest on loans contracted for public works, if sufficient, and if otherwise, the residue to be paid out of the treasury.

During the session, the following new companies for works of internal improvement were incorporated. Some of them are of great importance:—

The Cartersville Rail Road Company.
The Heningsville do do
The Tuckahoe and James River Rail Road Company.
The Farmville and Danville Rail Road Company.
The Petersburg South Western Rail Road Company.
The Pumpkinshire Turnpike Rail Road Company.
The Greensville and Alleghany Turnpike Rail Road Company.
The Giles, Fayette and Kanawha Rail Road Company.
The Middle Island Creek Rail Road Company.
The Lexington and James River Rail Road Company.
The Lynchburg and Buffalo Springs Turnpike Company.
The Brandonville, Kingwood and Evansville Turnpike Company.
The Valley and Shenandoah Turnpike Company.
The Staunton and Iron Works Turnpike Company.
The Dry Branch Gap Turnpike Company.
The Staunton and Covington Turnpike Company.
The Harrisonburg and Staunton Turnpike Company.

Looking still further forward to future improvements, the legislature directed the following surveys, which will give ample employment during the present season to the corps of engineers to be engaged by the Board of Public Works:

A route for the rail road from Falmouth to Alexandria.

Route for a rail road from Richmand by Farmville to Danville, and from Petersburg to Farmville.

Route for a road from Clarksburg by Middletown to a point near Pleasant Mills.

Routes for roads from Bear Garden Mountain, and from Romney in Hampshire to the national road, at or near Cumberland.

Route for a rail road from Wellsville in the state of Ohio (through Brooke county) to the Pennsylvania line.

Route for a road from some point on the free road in Buffalo Gap to some point on the Harrisonburg and Warm Springs Turnpike.

Route for a road from Sperryville to the Swift Run Gap turnpike, by way of the towns of Woodville, Fairfax, and Stevensburg.

Survey of Cheat River, from the point of which the North Western road touches it, to the Pennsylvania line.

Route for a turnpike from some point of the North Western Turnpike on Bond's Creek in Wood county to the Ohio River at the foot of Middle Island.

Route for a turnpike from the Kanawha salt works, by the falls of Kanawha and Vandals in the Loop, to Giles Court House.

Route for a turnpike from Lexington, crossing the Blue Ridge at White's gap, down the valley of Buffalo river, to D. Sandridge's in Amherst.

thence to New Glasgow and New Market, crossing Kye river at the Gulf ford in Nelson county.

Route for a turnpike from some point on the Pennsylvania line in Preston county, by Brandonsville and Kingwood, to some point of the North Western turnpike, at or near Evansville.

Survey of the Monongahela river and the valley thereof, from the Pennsylvania line to the junction of the West Fork and Tygart's Valley rivers —of the West Fork to William Bennett's in the county of Lewis, and of the Tygart's Valley to the town of Beverley in Randolph county, with a view to the improvement of the navigation of said stream, or to the construction of a rail road along the valley of the Monongahela river and one of said branches, or through the intermediate country.

Route for a road from the Kentucky line up the Louisa fork of Sandy river to Tazewell courthouse.

Route for a road from Moorefield to the Warm Springs, or to Hunterville.

Survey of Dan River from its confluence with Staunton river to the town of Danville; of the Staunton river from the same point to the town of Brookneal; and of the Roanoke river from Rock landing to the confluence of Dan and Staunton rivers, to ascertain their susceptibility for steamboat navigation.

Route for a road from Millborough to Covington.

Survey of Simmon's Gap in the Blue Ridge.

Route for a road from Elisha Sawyers' on the Kanawha turnpike, below Coal bridge, to Harmons ferry at the mouth of Little Guyandotte.

Route for a turnpike from Winchester to Harrisonburg.

Route for a rail road between Lynchburg and Buford's Gap.

Route for a rail road from Cartersville to Fredericksburg.

Survey of North River in Rockbridge, and of Meherrin River above Hicksford.

Examination into the propriety of a proposed change of location of a portion of the Cumberland Gap and Price's turnpike road.

Rail Roads.

Early in the session a bill was reported from the Committee of Roads, prescribing general regulations for the incorporation of rail road companies, which passed into a law; and in conformity to which, the charters of the new companies have been framed—as also those of formerly incorporated companies in cases where the state subscribed to their stocks. This general act embraces all the provisions of the most perfect charters, with various modifications of a beneficial character; but its principal advantages consist in the uniformity which it will give to future legislation on similar objects, and the time which will be saved to the General Assembly by conforming to a well-defined and uniform body of rules, instead of being at the necessity of settling general principles, and minute details, in their deliberations on each separate act of incorporation.

Transportation of the mails on rail roads.

The general act in regard to rail roads to which we have above referred, empowers the legislature hereafter to provide for the transportation of the mails on those roads, and to ensure to them adequate compensation for that service. On the insertion of this provision in the bill authorizing the state's subscription to the stock of the Louisa Rail Road Company, (which passed anterior to the passage of the bill prescribing general regulations,) there was considerable debate, and much adversity of sentiment. The Louisa Rail Road bill, as it went from the House, contained no provision in relation to the transportation of the mails. It was returned from the Senate with an amendment making it the duty of the company, on being applied to by the postmaster-general, to convey the United States' mails, and in case of a disagreement between him and the company as to compensation, &c., on his application, the governor was authorized to appoint three commissioners to fix the terms of transportation; and if the governor should not approve the report of the commissioners, he was to appoint three other commissioners for the same purpose—the company to carry the mails, if required by the postmaster-general, during the pendency of the controversy, receiving for that service payment at the rates finally fixed upon. This amendment was warmly opposed in the house, where it was argued that it would, in effect, place the company at the mercy of the postmaster-general, and subject the rail roads in this state to a control which was not allowed over those of other states. Two amendments were offered by Mr. Stanard, and negatived—one exempting the company from the operation of the provision until a similar arrangement should have been agreed to by the rail road companies in contiguous states—the other withholding the power granted the postmaster-general by the Senate's amendment, until the company should refuse to carry the mail for the same compensation as might be paid to rail road companies in the contiguous states. An amendment to the Senate's amendment was offered by Mr. May and adopted, substituting for the latter a declaration that it should hereafter be competent for the General Assembly, in case of a disagreement between the company and the postmaster-general, to pass a law empowering the governor to appoint commissioners to fix the rates of compensation, &c. But on the question of agreeing to the Senate's amendment as amended, Mr. Witcher opposed it, and moved to amend by striking out the whole, and inserting a simple declaration, that it shall be competent to the General Assembly hereafter to provide by law for the transportation of the mail for adequate compensation, and to prescribe a mode by which the same shall be ascertained. This motion was adopted by a large majority; and a similar provision inserted in the act prescribing the general terms of rail road charters, renders it applicable to all companies coming under the purview of that act.

From the (London) Farmers' Magazine, for March, 1837.

A NEW OLEAGINOUS PLANT.

The celebrated botanist *Candolle* has called the attention of European agriculturists to a plant cultivated in Abyssinia and India, from the seeds of which an oil is extracted, which is used not only in the preparation of food, but various other neces-

sary and domestic purposes. It is an annual herb, named *Mam-tilla* in Bengal; and, as all the plants of that tribe readily habituate themselves to our climate, it is capable of being made a valuable addition to our oleaginous seeds.

BONE MANURE.

The attention of the purchasers of crushed bones is called to the fact, that at this present moment the whole of the refuse from the glue yards of Scotland and Newcastle is imported into Hull for the purpose of grinding up with bones. It is a manure, I admit, but of very inferior value to bones, usually bought at 1s per bushel; the present price of bones, 2*s* 6*d* a bushel, holds out great inducements to adulterate. When you purchase crushed bones, let the merchant be asked the question (on oath) whether they are mixed with saw-dust, scrapings of warehouses, refuse of glue yards, &c. The farmers of Lincolnshire, convinced of the facts above stated, are this year buying the bones uncrushed, and hiring portable mills for the breaking of them. It is intended to publish the names of the parties to whom vessels are consigned for the purpose of cheating the farmer.—[*Ib.*

BREAD FOR CATTLE AND HORSES.

Experience has proved in Sweden that one ton of oats make four hundred and eighty loaves, on which a horse may be better kept (at the rate of two loaves a day) for two hundred and forty days, than if he had had six tons or even more of raw oats. The husk of the oat remains mixed with the flour; the weight of the water used in making the dough is gained, and a great deal of water is necessary. With a given quantity of wheat flour, *without the husk*, a quantity of bread is made for the use of man, weighing more than the raw grain *with the husk*. On the other hand, a less weight of bread than of oats should be given to horses, because the bread is more nourishing, especially if rye be mixed with the oats. It has been calculated in Sweden, that after all expenses have been taken into consideration, a great saving is effected by feeding the horses on bread made of oats and rye. They never give them hay without mixing it with two-thirds of chopped straw, and adding bread broken up. The better to preserve this bread, it should be made in the shape of cakes; and if it be prepared like biscuit, it will keep very long without losing its nutritive qualities.—[*Ib.*

USE OF HUMAN BONES.

Many tons of human bones are every year sent from London to the north, where they are crushed in mills, contrived for the purpose, and used as manure. Yet, with all this clearance, the number of the dead increases in such frightful disproportion to the space which we allot for them, that the question has been started, whether a sexton may not refuse to admit iron coffins into a burial-place; because, by this means, the deceased take a fee simple in the ground, which was only granted for a term of years. A curious expedient has been found to answer at Shields and Sunderland. The ships which return to these ports with ballast were at a loss where to discharge it, and had of late years, been compelled to pay for the use of the ground on which they threw it out. The burial grounds were full: it was recollected that the ballast would be useful there, and accordingly it has been laid upon one layer of dead to such a depth that graves for a second time are now dug in the new soil.—[*Ib.*

From the Bath and Cheltenham Gazette.

WATER TANKS.

At the late meeting of the Cornwall Polytechnic Society, a description was given of nine tanks, which had proved eminently useful during the late three dry summers on the Sussex property of Davies Gilbert, Esq., the President of the Society. As these tanks are cheaply and easily constructed, and not liable to decay like wooden vessels, and as rain enough falls on every house in England for the use of the inhabitants, no family would be deficient in good soft water, who made a tank to *retain* it; and such tanks being paved over, take up no room.

The tanks of East Bourn vary in size: one of less than seven feet deep and wide has served two laborers' families for three years; whilst most of the springs in the neighborhood were dry.

A tank 12 feet by 7 had supplied with water a large family and six horses. This was surrounded by only 4½ inches brick-work resting solid against the sides, in consequence of being smaller at the bottom than higher up; and the dome is constructed on the Egyptian plan, by projecting horizontally each row of materials one-third of their length beyond those below, and filling up the back with earth as it proceeded, to balance the weight of this projecting masonry.

At the East Bourn workhouse for fourteen parishes, a tank has been made 23 feet deep by 11 wide, of the roughest materials, being only flint stones, and though they require more mortar than if they had been regularly shaped, only 90 bushels of lime were allowed, including two coats of plaster, and the workmanship is executed like field walls at 10s. per 100 square feet; the only essential being that *no* clay be used (which worms bore *through,)* and that the lime, or Parker's cement be good.

A current of air is said to promote the purity of water in tanks, and this is easily effected by the earthenware or other pipe which conveys the rain from the roof, being six or eight inches in diameter and an opening left for the surplus water to run away; and where prevailing winds do not blow soot and leaves on the house, the water remains good, even for drinking, without clearing out the rubbish more than once a year; but in some cases filtering by ascension may be found useful, and be effected by the water being delivered by the pipe at the bottom of a cask or other vessel from which it cannot escape till it has risen through the holes in a board covered with pebbles, sand, or powdered charcoal.

Upwards of twenty laborers' gardens have been watered by the rain which formerly injured the public road, and was therefore turned into a sink-well, which sink-well was enlarged and surrounded by nine-inch masonry, and the water is drawn up by a *cast-iron curb.* This water was

used in planting potatoes, and occasioned good crops in 1834, when sets not watered failed. And should the profitable mode of *stall-feeding* now practised at Armagh be happily extended to England, and fatting oxen be kept *in pairs not tied up under shelter*, it will be found that preserving in tanks the water which falls on the barns and stalls will amply supply them, whilst it prevents the rain washing away the strength of the manure when straw is spread in the open yard.

Ponds have been made with equal success, dug only 4½ feet below the surface, what is excavated being added to the sides, and covered one foot thick, like a road, with pebbles and good lime mortar. Such ponds are becoming general on the dry soil of the South Downs for the use of large flocks of sheep; and had such ponds been made in Romney Marsh, &c., during the late dry years, the sheep would not have died in such numbers as materially raised the price of meat in London.

From the British Farmers' Magazine.

MANUFACTURE OF BEET-ROOT SUGAR.

[The following full account of the various processes required for the manufacture of beet sugar, is taken from the last number of the British Farmers' Magazine. It was compiled and translated from the works of M. Dubrunfaut, and others, the latest and best authorities on this subject, by Samuel Taylor, Jr., for the work from which we copy it. Much interest is now felt in England, as in this country, in regard to this new branch of industry; and it is to be presumed that as this essay is the most recent, it embraces the newest and most valuable improvements. Directions on this subject, from several authors, have already been published in this and other agricultural journals in this country; but they generally are too concise, and those which are most full, and also proceeded from the highest authority of their time, (Chaptal's,) were written before the latest improvements in this manufacture were known, and before its now ascertained great profits were even suspected to be obtainable. Therefore, it is supposed that the publication of this treatise is not superfluous, and it is hoped that in presenting it to our readers, we shall render some service to all who desire to commence this new business.—Ed. Far. Reg.]

Introduction.

We will now proceed to notice the methods by which the greatest quantity, and the best quality, of sugar can be obtained from beet root.

Sugar is a component part of this root, and that method of extracting it is to be preferred, which destroys the least portion of it in the course of the operation; for, in the present state of the art, it is undeniable that a certain quantity is destroyed.

Most of the beet sugar manufacturers refine their own sugar; a method not approved of by the author. The art of refining is very complex, and difficult to manage, and requires a long and intimate acquaintance with practical chemistry. The agricultural manufacturer, therefore, should confine his attention to the making of raw sugar only, and that of as good a quality as possible, to sell to the refiner. It is only when the making of brown sugar is finished that refining can begin. Consider then, the time which must elapse before a manufacturer can realize any profit upon his business: for it will be remembered that the process of refining lasts for six or seven months, or the whole of the season of vegetation. From the moment, therefore, that he sows his field, he is but then finishing the manufacture of the preceding crop into brown sugar. Then comes the refining, which does not terminate till six months after; so that he has to wait fourteen or fifteen months before he can begin to sell his sugar, and probably eighteen months before the whole is sold. Add to this a credit of three or four months usually given to the buyers, and it will form a total of twenty-two months, or thereabouts, before he can expect to make his returns; whereas, if he sells the raw sugar, he will be able to begin to sell in seven or eight months after the seed time, and will have sold the whole in a year after the same seed time.

Those manufacturers would be more at their ease as to capital, who would first use a part of their own crops in their manufactory, and would afterwards treat with the little farmers for what they could spare of *their* produce. Thus, those who have not the means of forming an establishment of their own, will yet participate in some of the advantages of beet culture, the pulp of which they can re-purchase of the manufacturers.

I shall next proceed to describe the several operations connected with the manufacturing department, according to the order in which they follow each other.

CHAP. I.

Cleaning the Beet Roots.

When the roots are to be washed, it is not necessary that so much pains should be taken in scraping and cleaning them by hand; but when it is not intended to wash them, the cleaning ought to be particularly attended to. This work is mostly performed by women and children. They are furnished with a sharp knife, two or three inches broad, and about ten inches long, with a suitable handle; and thus provided, they seat themselves near the heap of roots to be cleaned, and scrape each root separately, taking especial care not to leave any stones or dirt adhering to its surface. When a root is thought to be too large to enter the rasp properly, it should be cut in two or four pieces by the cleaner, according to its size. This should be done lengthways of the root.

The cleaning should take place in some spot convenient for the rasping mill and presses, and should be large enough to hold a quantity of roots sufficient to supply the manufactory for at least four or five days, and yet leave sufficient room for the cleaners to work in with comfort. After cleaning, the roots are thrown into a small open basket with ears, (like our turnip skeps.) They are then carried by the women to the rasp, where they leave the full baskets, and bring back empty ones. Two women well used to the work will clean, and carry to the rasp, three or three and half tons of roots, in twelve hours.

The cleaning, of course, diminishes, in some measure, the weight: perhaps about six or seven per cent. on the gross weight of the roots.

CHAP. II.

Washing the Roots.

Washing is not indispensible where proper pains have been taken by the cleaners; neither can it be done in every situation, the quantity of water required being so considerable. A stream of water contiguous to a sugar manufactory would be an important advantage. In general, however, the washing is attended with many difficulties, particularly those arising from frost, which not unfrequently puts a stop to it entirely; and some are disposed to think that it may be dispensed with altogether, by spending a little more time and money about the previous cleaning, and especially by using a large rough brush, after the scraping knife; but this latter has not yet been tried.

It is important that the vulgar prejudice in favor of washing, and even the idea that a large quantity of water is required in the manufactory of beet sugar, should be done away with. The manufacturers may rest assured that the want of water need not be an obstacle to an establishment, in any case; and that the quantity absolutely necessary to carry it on is very small indeed.

CHAP. III.

Rasping the Roots.

When M. Achard first attempted to make sugar from the beet root, he began by drying the roots by steam, then reducing them to paste by a mechanical process, and finally extracting the juice by pressure. It appears that the plan did not succeed, for he abandoned it. In fact, it is not that the sugar undergoes alteration from this drying or baking the roots, but that the pulp resulting from the drying process is so finely divided and slippery, as to render it extremely difficult to separate the juice from it. After many ineffectual attempts, M. Achard at last resorted to the method of rasping raw.

The texture of the beet root is so firm and compact, especially the better varieties, that mere pressure will extract but a small proportion of its juices, which appear to be enclosed in a number of little cells, and it is necessary to break these by rasping, in order to set the juices at liberty.

Other circumstances being equal, the best and most minutely divided roots will yield the greatest quantity of juice with the least pressure; and this constitutes the perfection of rasping.

1. *Rasping Machines.*

There are rasping mills of various kinds, but that invented by M. Molard has been considered one of the best in use. The principle is that of a cast-iron cylinder, set round with jagged, saw-like blades, by means of which the roots are cut, torn, and squeezed, till they part with as much of their juice as is possible. It will rasp about three and half tons of beet in an hour. Price charged by M. Molard on delivery, 1000 francs (£41 13*s* 4*d*.) The cylinder alone is worth half this sum, therefore an extra cylinder will add so much more to the cost of the machine.

2. *Operation of Rasping.*

Two laborers are required to work M. Molard's rasp, or sometimes it is worked by one man and two children.

Of all the operations connected with sugar making, the rasping demands the greatest expedition. As little as possible should be rasped beforehand, because the pulp speedily alters by exposure to the air. In fact, this alteration shows itself in a quarter of an hour, or, at most, half an hour after rasping. This operation, therefore, should only keep pace with that of the press, and not be much in advance of it.

The rasp should be washed at least once a day, and kept as free from dirt as possible, all particles of juice, or pulp, being but the elements of fermentation.

3. *Power for Working a Rasp Mill.*

The rasp ought not to be worked by hands, on account of the expense. Horses or oxen are far cheaper, and more powerful agents, but better than these are wind or water powers. The last decidedly the best, wherever a sufficient fall can be obtained. Of the two first mentioned, the author gives the preference to oxen, as working equally well, and requiring far less costly keep than horses, the pulp from the mill being generally all that is required to keep them—a description of food which horses will not touch.

M. Dubrunfaut is inclined to prefer a wind power, as being a more practical and general agent than either water or steam, the former being rarely to be met with in level agricultural districts, and the latter very expensive, except in the immediate vicinity of coal. The society for the encouragement of national industry, aware of the importance of this power, offered a premium of 4000 francs (£166) for the best mill, which premium was awarded to M. de Lamolère. It is intended to be placed on some one of the farm buildings. Cost only 2,400 francs (£100;) horses or oxen may be attached to it in the absence of wind; this provision is absolutely necessary in a beet-root sugar manufactory. A pair of stones may also be added, by means of which the family may be supplied with meal and flour. The only inconvenience attending a wind power is its inequality. This has sometimes been complained of by the raspers.

CHAP. IV.

§1. *Extraction of the Sugar.*

The extraction of sugar from the pulp is only to be performed by pressure; and the more powerful this is, the more the juice from a given quantity of pulp. However, it is impossible, do what one will, to get it all out; for, even after the greatest pressure, the pulp will still continue moist.

In this operation, as in many others of a like nature, the last particles of matter become so difficult to obtain, as to render it more economical to neglect them altogether. Thus in pressing the pulp of the beet root, the first juice runs out of itself from the bags, and it continues to flow abundantly under the slightest efforts of the press, which the first always are; the quantity then decreases, perhaps in the inverse ratio of the square

of the pressure. The remark may appear puerile, but it is highly important, as we shall soon see.

Suppose, for example, that with a known power, a certain quantity of juice is expressed in a given time from a mass of pulp. Suppose, in order to give the press the maximum of effect of which it is capable, that three men are employed for one hour, and that by this means 70 per cent. of syrup from the juice is obtained; it is probable enough, that by applying double the pressure after this, not more than 10 per cent. in addition will be obtained. It then becomes a question whether the quantity so obtained be worth the cost of producing it.

Mr. Caffer employs a hydraulic press of the power of ten tons, on a surface of about 74 square inches. This was charged in the presence of the author, and from the pulp about 70 per cent. of juice was obtained at the first operation. The power was then doubled, but not more than 8 per cent. of juice was the result, which, as before observed, hardly paid for the labor of producing it. However, on this point, much depends on the nature of the power used; for it is obvious that wind, water, steam, or even horses and oxen, are less expensive than hand labour, now so commonly resorted to.

It may be imagined that an increase of power in this department would fully answer the required end; but, as has been said before, it is to the rasp that we must look for obtaining the greatest results from the press.

All roots do not give out the same quantity of juice from similar rasping and pressing. Those which are richest in sugar give far less of it than those of a more watery formation. The operations of extraction being the same, it is only the different proportions of water which influence the quantity of juice afforded by the roots; and as the richness of the juice is ascertained in a manner sufficiently exact by the areometer, we may, by the help of this instrument, pretty nearly determine the quantity of roots which must be rasped to obtain a given body of juice.

Thus, with a good rasp and a powerful press, the following quantities of juice may be obtained proportionably to their areometrical densities:—

A	5°	80 per cent.
A	6°	75 "
A	7°	70 "
A	8°	66 "
A	9°	63 "
A	10°	60 "

Supposing that the experiment be tried on twenty-five hectolitres (88 English cubic feet) of juice, weighing 6° by the areometer, it would be necessary to rasp and press $3\frac{1}{4}$ tons of roots; at 7°, $3\frac{1}{2}$ tons; at 8°, $3\frac{3}{4}$ tons; and so on in proportion.

It is important that the operation of pressing should be done quickly; for as little delay as possible should take place between the rasping and pressing; as also between these and the defecation.

§1. *Of Presses.*

A variety of presses have been mentioned as applicable to the manufacture of beet-root sugar, as the screw, the lever, the wedge, the cylinder, and the hydraulic. Of these the last is decidedly the best, as extracting at one operation all the juice that the pulp is capable of affording.

2. *The Accompaniments of a Press.*

These accompaniments are the following:

1st. The bags which contain the pulp.
2nd. Osier hurdles.
3rd. A flat reservoir for preparing the bags in.
4th. A cistern for the juice, with pipes, pump, &c.

1. *The Pulp Bags.*

These bags should be made of strong materials: Russia canvass, for instance. The texture should not be too close, so as to injure the juice from escaping, or they will be in danger of bursting; neither should they be too coarse, or the pulp will squeeze through the meshes. This last inconvenience is, however, of less importance, and of less frequent occurrence than the other.

The size of the bags ought to be regulated by the power of the press; observing always, that the surface pressed should never extend beyond the edges of the press itself.

As to the number of bags, that must, of course, depend on the number of working presses, their size, and the charge of pulp which each bag is made to hold. Thus, suppose a press of which the height of the pressing space is three feet three inches, and that each bag shall be so filled, as, with the hurdle, to take up a thickness of $1\frac{1}{2}$ inch, it will then require twenty-five bags for each charge pressed. Add to these, five others for extra occasions, it will then form what is called a *set (un jeu de sacs)*. If the press is kept at work day and night, three sets will be required; but, if only in the day, two sets will be sufficient. They ought to be changed every twelve hours. In some manufactories they use but one set, even if working day and night; but this is by no means desirable. Reckoning five months as the average length of the working season, one may fairly calculate on wearing up a set of bags in each season. The bags ought to be carefully washed in hot water every twelve hours, in order to keep them as free from impurities as possible.

Hurdles.

The hurdles are made of osier, either peeled or unpeeled. They support the pile of bags under the press, and ought to be very strong and well put together, though not cumbrous. The dimensions will depend on those of the face of the press; at all events, they ought not to be larger. It is needless to describe the destruction of these wicker hurdles further than to say that it resembles that of common hampers in its texture. The number of the hurdles must correspond with that of the bags, *plus* one. It will be advisable to have several sets of them, that they may be renewed every twelve hours. The same care is necessary in washing them frequently, as in the case of the bags; this is done in a flat cistern, of which mention will be made by-and-by, and which also serves to arrange the bags in. For this purpose the cistern is half filled with cold water, into which a certain quantity of unslaked lime is thrown. Each

hurdle is then carefully passed through the liquor, afterwards well rubbed with a brush, and then washed in clean water.

Cistern in which the Bags are Prepared.

The cistern should be large enough to contain the juice which is separated during the above operation; it ought to be a few inches wider than the hurdles, and a foot or so longer than double the length of the same. Thus supposing the hurdles are 2 feet wide, by 2½ feet long, the cistern should be of the following dimensions:—

Breadth	2½	feet.
Length	6½	"
Depth	1	"

There should be a cock in one corner of the cistern. This vessel ought to be of stout wood, lined with thin copper. Its situation in the building is between the rasp and the press; and one of its ends ought to be as near as possible to the cistern for receiving the pulp from the rasp. For the convenience of working, it ought to be raised a few inches above the level of the floor. It should be surrounded by four stout moveable rails to hang the bags on, when they are arranged.

It is in this cistern that the hurdles are recommended to be washed with the cold lime water. It is needless to say, that after such washing, the dirty water should always be let off, and clean admitted. Cleanliness is indispensable in every stage.

Cistern for the Juice, Pipes, Pumps, &c.

This cistern serves to receive the juice as it comes from the press; and from thence it is transferred immediately to the clarifying copper. It should be provided with suitable pipes, leading from the press into it, and with a pump to throw up its contents into the clarifying copper. This cistern, therefore, should be placed lower than the press; and, like the former, should be of stout wood, lined with copper. The bottom should be slightly inclined, to enable the juice to draw to one side, at the lowest part of which is a hollow, in which the end of the pump is inserted, that it may be entirely emptied.

The dimensions depend on the mode of working. If only one defecation take place in twelve hours, the cistern need not be above half the cubical size of the defecating copper. But if the plan be to work on small charges, so as to make two or three defecations in twelve hours, then the cistern ought to be of equal capacity with the copper. The form is of no importance whatever. The pipes should be of copper, and the whole carefully and frequently washed with lime water, and afterwards well rinsed.

3. *Operation of the Press.*

The cistern in which the bags are prepared, being placed as above described, one of its ends being a foot or more from the pulp cistern. the four rails are fixed, to support the hurdles. On the top of these rails, as a frame, a hurdle is laid; and on the hurdle, a bag charged with pulp; the bag and its contents are then spread evenly on the hurdle by two laborers, so as when finished to occupy a comparatively small space in point of thickness. This done, another hurdle is placed upon the bag, then a bag, and so on, in alternate layers of bags and hurdles, till the pile amounts to ten or twelve bags; it is moved to the other end of the cistern, where it remains till a third laborer carries it to the press; another pile is then formed of equal height to the one removed, which, in its turn, is moved on, and replaced by another. The average charge of the press is thirty bags. It is unnecessary to explain further the details of this operation; experience would very soon dictate the best system of working; we shall, therefore, go on to say, that when done, the press is discharged, and the three laborers proceed to empty the bags in a place appointed to receive the pressed pulp. The bags and hurdles are then separated, and got ready for another charge. Supposing that only one set of bags and hurdles are in use, it is easy to work off ten or twelve charges of a hydraulic press in twelve hours. Thus from charges amounting to 400 kilogrammes (883 lbs.) of pulp, one should press in a day 4 tons to 4¾ tons of roots, which, at seventy per cent. of juice, would yield from 644 to 764 gallons of juice. This juice is received in the cistern before mentioned.

During the preparation of the bags, there collects in the cistern, in which this work is performed, a certain quantity of juice, which would be hurtful if suffered to remain there long. This, therefore, ought to be removed at every charge, or, at most, every two charges of the press, which is easily done by the plug, or cock, at the bottom of the cistern, and which communicates by pipes with the juice cistern.

CHAP. V.

Defecation of the Juice.

The juice of the beet, as it first issues from the press, contains all the soluble matter of the root, an analysis of it giving (as will appear hereafter,) a mixture of sugar, water, and divers foreign substances. If the juice contained nothing more than sugar in solution with water, it would be easy enough to separate them by the simple process of evaporation, the water goes off in steam, and leaves the sugar behind. What then hinders the extraction of sugar from beet-root juice by the same simple means? The answer is obvious. Because of the foreign matter which the juice brings with it, and which, combined or mixed with the sugar, render the evaporation of the water difficult, and its crystallization extremely troublesome, if not impossible. The attention of the manufacturer must, therefore, be directed to the separation of these particles, and this is accomplished by the process known generally by the name of *defecation*. This is entirely a chemical operation. It consists in finding such agents as will precipitate, in a solid form, all the substances foreign to the sugar, whether in combination with it, or solidified without such combination. It is necessary also that these agents shall not be of a quality to alter the sugar when in contact with them, and that they may be afterwards carried away with the residuum. Whatever be the nature of the agent employed, it ought to be simple, and open to the comprehension of a common workman, and moreover, that it be not of too costly a description.

The only agents used in defecating are, sulphuric acid and lime. Great care is requisite in using them.

It has been elsewhere stated, that the re-action of defecating agents ought to be assisted by heat; and it is on this account that coppers, or boilers, are resorted to. The following section describes this method of defecation.

§. 1. *Boilers for Defecation.*

These vessels ought to be circular, and should be formed of copper. Their dimensions vary with the magnitude of the works, from 228 gallons to 570 gallons; though some prefer a number of a smaller size, say 40 to 50 gallons. It is agreed on all hands, that the interval between the raspage and the formation of syrup ought to be as short as possible, in order to produce the most profitable results. In fact, the friction occasioned by rasping is necessarily accompanied by a certain portion of heat, which tends to increase the action of the press. Now, it is well known, how detrimental the action of heat is to all organic substances, dissolved or suspended in large watery masses. This action is easily discernible between the root and the pulp, and then again between this latter and the expressed juice. The change goes on increasing in proportion to the interval between the rasping and the defecation. The decomposition has often been such as entirely to prevent the formation and separation of the sugar. The copper then should be filled in the shortest possible space of time; but if large masses are acted upon, and, consequently, large coppers made use of, it is essential, in order to charge them rapidly, that a number of rasps and presses should be employed, proportioned to the required despatch of the operation. Thus, to charge a boiler of between 500 and 600 gallons in two hours, which would be a reasonable time enough, it would be necessary to rasp and press, during this interval, about four tons of roots. Supposing that a rasp is used which in twelve hours will finish eight tons of roots; supposing also a hydraulic press which is capable of working of 880 lbs. of pulp in one hour, it will require, in order to obtain 570 gallons of juice in two hours, three rasping mills and five presses; but if only this quantity is required to be obtained in twelve hours, and, consequently, that there is but one defecating boiler, the three rasps and five presses will only work two hours a day, and remain idle the rest of the time. This is bad. On the other hand, when it is attempted to fill a boiler of 570 gallons by means of only one rasp and one press, the inconvenience will occur of delaying the juice before the process of defecation can be begun. Both these evils ought to be avoided.

A variety of reasons are given by M. Dubrunfaut, for preferring boilers of a medium size to those of large dimensions. He considers those of about 90 or 100 gallons as much more convenient than the larger sizes before enumerated. Of course two or more would be required, according to the magnitude of the work. Two boilers of these dimensions would readily do the work of one of 570 gallons, and the first cost of them would not be more. As soon as one is brought to the boiling point, the fire can be removed to the grate of the other; in short, whilst the process of defecating is going on in the one, the other may be left to precipitate its extraneous substances.

A defecating boiler, intended to act by precipitation, ought to be equal in height to its diameter. A fifth of the size absolutely required to contain the juice should be allowed for boiling space: thus, a boiler which would hold 100 gallons, ought to be large enough to *boil* one hundred and twenty gallons in. The boiler ought to be mounted to such a height as to allow of the liquor running off clear, by an easy slope into the evaporating boiler. The temperature should never exceed 80° of Reaumur (212° of Fahrenheit.) Thus, admitting that the boiler is 36 inches in height, and the same in diameter, it should have a grate of about the following proportions:—

Length . . . . . 23 inches.
Breadth . . . . 15 "

This grate is of cast iron and composed of 10 bars. The bottom of the boiler is placed about 15 inches above the grate, round which is a flue to enable the flame to circulate to the height of the charge. This flue, at its opening into the chimney may form, in section, a parallelogram of 140 square inches. A boiler on this construction presents to the fire a surface of 413 square feet, and will boil its contents in about three quarters of an hour, with the consumption of 24 lbs. of coal. If wood is burned there must be double the quantity allowed.

§. 2. *Appendages to a Defecating Boiler.*

They are the following:—

1. A thermometer and an areometer.
2. Scales and weights to weigh the lime.
3. A bin for lime, and wooden pails or buckets.
4. A measure either of lead or copper, for sulphuric acid.
5. A wooden instrument to stir up the liquor in the boiler.
6. A plated spoon, to observe the juice with, and an experiment saucer.
7. A skimmer.
8. A filter and funnel.

Areometer and Thermometer.

Beaumé's areometer is generally allowed to be the best; it should be provided with a tin case, having a wooden handle. The liquor about to be weighed is drawn up in this tin case, which is held by the handle. It is important that the juice should be examined always at the same temperature. It should be taken as it comes from the press, and plunged, by means of the tin case, in water from a well or pump, so as to reduce it to a temperature of 10° of Reaumur (55° of Fahrenheit.) Then insert the areometer; and if all subsequent trials are made with the same precaution, the comparative results will not fail to be correct. In this state the juice varies from 5° to 10° (areometriques) of Beaumé. If weighed when boiling, a difference will be found of 4° more or less, because then, the heat expanding the liquid, diminishes the specific gravity of it.

The areometer will also be found useful in the evaporation of the juice, to estimate the precise time favourable to clarification. Being of glass, and consequently very liable to be broken in the

hands of common workmen, it will be necessary to have a number of them at hand.

The thermometer is used in defecation to judge of the state of the temperature, and thence to ascertain the proper time for adding the clarifying agents. The most convenient place to hang it is near the boiler, and it ought to be immersed in the liquor during nearly all the time of the clarification.

Scales and Weights to weigh the Lime.

These, it is unnecessary to say more of, than that they should be capable of weighing from 5 lbs. to 50 lbs.

Bin to slake Lime in, and Buckets for the Liquor.

The lime employed for the defecation of beet-root juice is generally unslaked, weighed in that state, then slaked with water, and afterwards, by adding more water, reduced to the consistency of cream. For this operation a bin, or cistern, of a particular form is required: it is, for the most part, circular, with a cover.

M. Dubrunfaut, however, is of opinion that lime should not be weighed till after it is slaked, as yielding more certain and uniform results; in which case, a large quantity might be slaked beforehand. It is sifted pretty fine, to separate all the coarse and unburnt lumps, which, in the usual method of applying the lime, are reckoned as so many active agents, whereas, they are of no use at all in the clarifying process; and hence many errors in the general results.

A Lead or Copper Vessel for the Sulphuric Acid.

The sulphuric acid is usually diluted with five of six parts of water before using. This is performed in a wooden bucket, the hoops of which are of copper, instead of iron.

Instrument for stirring the Liquor in the Copper.

This should be a round stick or pole, twice as long as the copper is deep. At one end is a round piece of wood, about a foot in diameter, pierced with holes.

A Plated Spoon in which to Examine the Juice, and a Saucer.

The spoon should be kept bright, that the workman may judge more readily when the clarification is complete.

The saucer should be very white. The use of it is to receive the small drops of syrup of violets and *tournesol*, to ascertain, by touching them with the liquid under clarification, the excess of alkali and acid.

Large Skimmer.

This ought to be at least eight inches in diameter, and to be fixed to the end of a long handle. It is not always considered necessary to remove the scum from the boiling liquor, and especially when the precipitating system is resorted to, as it forms a sort of cover or guard to the liquor against too sudden refrigeration by the action of the air.

Filter for Skimmings.

An enclosed or covered filter is recommended in preference to the one in common use, it being important, in order to get as much liquor from the skimmings as possible, that they should not be suffered to cool too fast. The construction should be the same as that hereafter described for the juice, only that the one may be made of coarse cloth, or canvass, and the other of fine linen. The filter should be provided with a receiver adequate to the amount of juice from one charge.

§. *Of the different methods of Defecation.*

This is one of the most difficult operations connected with the manufacture of beet-root sugar. The results are perpetually changing, as the nature of the root changes during the progress of the work. We proceed to describe the simplest and most economical of the means employed, viz., lime alone, or sulphuric acid and lime together.

The first method of defecation--that of the Colonies.

After detailing the origin and progress of defecation in France, the author proceeds to show that lime alone, if not the best means, is at least capable, in good hands, of producing very important results; and instances the manufacture of M. Houdart, near Douay, as one of the best and most successful on this principle. Suppose 114 gallons of juice are to be clarified. The boiler being charged, and the fire burning, the thermometer is placed in it, and should be kept there till it amounts to 60° or 65° (167° or 178° of Fahrenheit.) During this interval eighty-eight pounds of lime slacked and sifted, are weighed out; four or five other bags are then similarly prepared, each bag containing 7 pounds of lime. This done, the 88 lbs. of lime are put into a wooden vessel, where they are mixed with clear water, till they become like milk. This mixture is poured into the boiler when the temperature is above 60° or 65° (Reaumur.) The whole is then briskly stirred for some minutes, in order to incorporate the lime well with the liquor. Before the lime is added, a thick scum will show itself on the surface. Lime often destroys this scum, or, at any rate, it is suspended in the liquid by agitating it when the lime is added. When thoroughly mixed, some minutes should elapse before the full effect will be produced; then, with a bright spoon, take a little of the liquor, and examine it carefully: if the quantity of lime be sufficient, the juice will exhibit a number of clots, or particles, in suspension, which will soon settle to the bottom of the spoon, leaving the upper part of the liquid perfectly clear and transparent, and more or less of an amber color. If, instead of this, the lumps are very much divided, and only swim in the liquor without settling to the bottom, even for several seconds, and if the juice remains of a thick milky color, it is a proof that more lime is wanted.

One of the little parcels of 7 lbs. is then mixed with water, poured into the boiler, and well stirred as before. The juice is then again examined with the spoon, and if the symptoms are still not so favorable as they might be, another 7 lbs. are added, and so on, 7 lbs. each time, till the defecation of the whole is complete.

88 lbs. of lime to 114 gallons of juice may always be used with safety. It is, in fact, the minimum dose that ought to be applied. The quantity varies with the quality of the beet root, and the period of the season when it is applied. Thus, at the beginning of the season, when the roots are rich and full of sugar, the greater will be the proportion of lime necessary. The object of the lime being to precipitate certain substances which impede the formation of sugar, it should, of course, be added in quantities adequate to the amount of these substances; for, experience seems to show, that as the quantity of sugar increases, so will also these extraneous matters. Thus, a firm, solid beet root requires more lime than a watery root, and *vice versa*.

On the whole, the safest way is to *begin* with *little* enough of lime, for it is very easy to add more from time to time, as above directed. But it is not to be inferred from hence, that, *on the whole*, a small quantity is preferable to a larger. So far is this from being the case, that it is considered better to use too much than too little; for though an excess of this alkali is prejudicial to the sugar, it is always less so than an insufficient quantity. The observations of the workman cannot be too frequently taken during the process of defecating. A clear liquor, and a perfect precipitation, are the main objects to be accomplished. If these are not obtained, or imperfectly so, the results will be sure to suffer.

It has been imagined by M. Barruel, that the red beet requires more lime than the white; but M. Dubrunfaut considers this opinion as not altogether correct, and is rather disposed to refer the apparent difference to the season, which might that year produce a red beet of a firmer and less watery description than the yellow.

The beet juice, when it first comes from the press, it is of a milky hue, and yet dingy. When heated, the scum and froth rise; but as soon as the lime is added, the black, dirty color disappears by degrees, and abundance of flakes are seen in the liquor. These flakes are usually of a yellowish grey color; when the proportion of lime is sufficient, they separate from the liquid and rapidly sink to the bottom. When arrived at this stage of the defecation, the fire must be withdrawn, and the boiler left to itself for an hour or two, that the whole may settle properly. The cock placed just above the bottom of the boiler should be opened, to draw off the liquor clear. The juice is then conveyed to the evaporating pans—of which more hereafter. Care should be taken to watch the liquor as it runs off, lest any part should become thick and turbid, especially towards the end; so soon as this is perceived, the cock should be closed and the lower one opened, that the residuum may pass through the filter. When this is all drawn off, the boiler is ready for a fresh charge.

The defecation by lime is denominated *the system of the colonies*, because there the process was made trial of, and long before beet-root sugar was even thought of. But it ought to be explained, that, in the present day, it is not used to so much advantage in the colonies as in France. There, in fact, the management is left to a slave, who, not unfrequently applies the lime at random: and, of course, the results are, and must be, very unequal.

It has been shown that it is better to use too much than too little lime in defecation. Both are stated to be evils, and yet of two evils, the former is the least. After having operated on the extraneous matter in the sugar, it then begins to act on the sugar itself.

Defecation by lime alone, then, has this grand inconvenience—that a part of the sugar is destroyed to obtain the other. In this process, in fact, when the syrup is run into moulds, it produces an abundant crystallization; and the molasses, which come from it more rapidly than by any other method, have a very disagreeable taste and smell; they have but little sweetness, and if by any known process a second crystallization be attempted, not an atom of sugar can be obtained from them. Nay more, the sugar partakes of the bad taste and smell of the molasses, and is thereby rendered unsaleable in the market. Even after refining, these objections are still more or less perceptible. M. Dubrunfautstates that he has experienced this himself, as a refiner. The sugar produced by the lime was always very fair to the eye, the grain large, strong, and open; but it had a particular smell, and left a disagreeable flavor in the mouth.

It is a pity that the defecation by lime presents these inconveniences, for it is the mode of all others the simplest, and best adapted to common farm establishments. It is, indeed, on this account that many manufacturers who have adopted it continue still to use it notwithstanding the inferiority it presents, both as to quantity and quality of its results, as compared with those of other and more complicated methods. It cannot be recommended, even managed in the best known manner. Its simplicity does not overcome its imperfections, and the author above quoted greatly prefers either of the following methods.

Notwithstanding the decided opiniod here expressed by M. Dubrunfaut against the the employment of lime alone as a defecating agent, it has been ascertained, by subsequent experience, that it is capable, under proper management, of producing very favorable results, both as to quality and quantity.

Second Method—French Process—

So called, because it was first adopted in France, and consists, in the first instance, of the use of lime to excess, and then neutralizing, in part, the alkalization of the juice, by sulphuric acid. M. Dubrunfaut has detailed the particulars of the following experiments made by M. Cafler and himself at the manufactory of the former.

Experiment 1.

At the time the narrator arrived, only two charges had been worked off, the third was then in progress, and great difficulties were encountered in the course of the work. The filtration was either impossible, or very bad. The syrup in the moulds, the produce of the two former defecations, furnished only a blackish sugar. On trying the sugar in the third boiler, it was found highly alkaline, and contained not only a little lime, but ammonia, and a good deal of potash, which entered into combination with the albumen, and formed with it a soluble compound. The charge under

defecation was 2500 litres, (570 gallons): 22 lbs. of quick lime had been put into the boiler. The precipitation had been tolerably good, but the scum when put into the filter was smeary,* and would not run. Sulphuric acid diluted with water was then added in small quantities, until the liquor indicated but a weak proportion of alkali.

From that moment the blood operated, the juice granulated well, and filtered with great ease and clearness. The flavor was sensibly improved; when put to boil it did not altogether present the same facilities as the alkaline syrup, but the proof was obtained without burning. The sugar crystallized well in the mould, was perfectly clear, had no bad taste or smell, and, in short, was infinitely superior to that obtained from lime alone. The syrup which flowed from this sugar was also well tasted and free from any unpleasant smell, and it was thought, by its strong saccharine flavor, to be capable of crystallization when reboiled, which ultimately proved to be correct, as succeeding experiments will show.

To obtain the above results the enormous quantity of two ordinary bottles of sulphuric acid at 66° was used in the clarification. The following experiment was made on the same quantity of juice.

Experiment 2.

Another boiler was defecated, as in the preceding case, with 22 lbs. of quick lime; then precipitated and evaporated till the clarification was concentrated. The only difference was, that after putting in the lime, the animal charcoal arising from two former charges was added. The juice of this defecation indicated an excess of alkali that was nearly neutralized by the diluted sulphuric acid. This time, it was imagined, that half a bottle of the acid (say 24 to 28 oz.) would be sufficient to render the alkali nearly neuter, whereas in the first experiment 106 oz. were required to produce the same effect. This is an enormous difference, and evidently depends on the animal charcoal, which acts on the alkalis as an acid, in the defecating process. This mode of applying animal charcoal is important and curious, as showing, that though it had already acted in a former instance, it still retained its neutralizing quality, and that the use of it in defecation had reduced the proportion of sulphuric acid to a quarter of that required without the carbon. The sugar was equally good with that of the preceding experiment, and the molasses reboiled, capable of an abundant crystallization.

This experiment was repeated several times, and always with the same results.

Experiment 3.

Another boiler was defecated with 22 lbs. of quick lime, as in the preceding cases, with the addition of the acid, only that the quantity this time was not confined to just enough to produce neutralization, but to a small portion beyond this. The clarification, notwithstanding, proceeded well. The blood produced its proper effect, and the juice filtered with ease; but in boiling, there was a great head of froth on the syrup, which it seemed impossible to keep down. In spite of every precaution to the contrary, the contents of the copper were much burnt. The syrup was drawn from the boiler, and then put into the moulds. These, instead of showing, after cooling, a smooth, solid surface, exhibited only a froth, which did not dry, though the grain formed well enough; and when the moulds were opened some days after, a pasty, but very fine sugar was discovered, and so smeary, as very imperfectly to purge itself of the molassess. These, mixed with the molasses of the preceding experiments, did not alter their agreeable flavor, but deprived them of their property of reboiling.

Observe, that in this experiment the excess of acid was very small, and hence may be shown the injury which this agent is capable of producing, when not used in proper quantities. The sugar is most affected by it when at a high temperature; for when cold, it has little or no effect. Much of of the loss and disappointment occurring in certain sugar making establishments have arisen from this source, the not knowing the proper proportions of sulphuric acid.

Experiment 4.

22 lbs. of lime were applied to 750 gallons of juice, the boiler being at the time at 65° of Reaumur, (178° of Fahrenheit); at 70° (189° F.) the scum had coagulated well, and the juice showed by its clearness and easy precipitation, that the proportion of lime was sufficient. Sulphuric acid diluted was then added, to neutralize, as much as possible, the excess of the lime; and to effect this completely, the enormous quantity of 4½ kilogrammes (159 ounces) was found necessary. The addition of the sulphuric acid increased the precipitation, and when boiled, the liquor was nearly without scum, and altogether, the defecation was good. Two boilers were thus treated, and their united contents boiled together; the result was perfectly satisfactory. The molasses had no bad smell or taste; on the contrary, they afforded every hope of succeeding, if reboiled, and this was confirmed by after experience.

The results of this experiment being so advantageous, it is hardly to be expected they will be materially improved upon; and, accordingly, we are told it is the method in common use in most of the principal establishments in France. M. Dubrunfaut has described the various plans pursued by M. M. Chaptal, Dombasle, the Duke of Ragusa, and M. Bernard, concluding with his own: the clarification, in this last case, taking place in boilers of 114 gallons, (500 litres,) which is considered by the author as the most convenient size. The boiler being charged, it is heated, and then clarified with lime; when enough of this has been used to make the juice perfectly clear, the temperature may be 190° to 201° (Fahrenheit,) the lime being applied as recommended, at 178°. The sulphuric acid is then added, having been diluted with six times its bulk of water. It is applied in small quantities, stirring briskly each time. Every time that the acid is applied, it will be necessary to examine the juice, which is done in the following manner. The operator should be provided with a spoon and a very white porcelain saucer. On the surface of this saucer, a few drops of syrup of violets should be placed, by means of a small

* *Smeary*—a technical term, equivalent to *gras, fatty*.

skewer, dipped into a bottle of the syrup. It will be as well, also, to have on this saucer a small quantity of well prepared blue turnsol. This done, he then may proceed to examine the juice.

The thick scum is first removed, which has been produced by the lime and sulphuric acid, a quantity of the purified juice is then taken in the spoon, to see if the clearness and precipitation go on well, proving, in that case, that the sulphuric acid has not been over-applied. The better to assure one's self of this, let a wooden peg be dipped in the juice contained in the spoon, which mix with one of the drops of syrup of violet in the saucer. If the alkali is predominant in the juice, the syrup of violets will change to a fine deep green color. In proportion as the alkali becomes weaker, the green will take the more time to develop itself, and will lose its deep hue. The addition of the acid must cease when the syrup, touched by the juice, turns but slowly to green. A certain number of drops of syrup have been recommended to be placed in the saucer, for the convenience of making several different experiments. It will not be amiss, after ascertaining by the syrup of violets that the proportion of acid is sufficient, to touch the spots of turnsol with the juice, in order to be satisfied that it will not turn them red; for it is the property of acids to change the blue color of the turnsol to red. This latter experiment is of no other use than to prove to an inexperienced practitioner that his eye has not deceived him in the former experiment. If too much acid, it must not only be neutralized by the lime, but there must be also a slight excess of this alkali. Care should be taken in the above trials, that the quantities of juice and syrup should be equal, or nearly so, for if either predominate, the results will neither be satisfactory nor correct.

When it is ascertained that the boiler contains but a slight excess of alkali, and after the contents have been well stirred, the fire is withdrawn, and they are left to settle.

In about half an hour the liquor will be clear enough to draw off. One may reckon that 114 gallons of juice, requiring 6 or 7 lbs. of lime, will take nearly a kilogramme (35 oz. av.) of acid to neutralize them sufficiently. Admitting that it requires the amount of two charges of the press to fill one boiler, from a quarter to a third of the weight of lime required for a defecation may be added to the juice, in the vessel in which it comes from the first press. This measure will be particularly advisable when the temperature of the place be at from 61° to 73° of Fahrenheit.

Third Method—M. Achard's Plan.

Achard, when he established his manufactory, was indebted to no one, either for plans or machinery, but struck out a path for himself, in which he has, to a certain extent, been eminently successful. His method of defecation differs from those we have been describing, inasmuch as, instead of using the lime first, and then the sulphuric acid, he begins with the latter, and neutralizes with the former. It differs also in other respects, which will be hereafter alluded to.

The juice, on first issuiug from the press, was deposited in large earthen vessels, where it was acidulated, This acidulation was obtained by $1\frac{3}{4}$ drachms (avoird.), $2\frac{1}{2}$ grammes of sulphuric acid for every litre (61 English cubic inches, nearly two pints) of juice, not more than six or seven hours elapsing between the extraction of the juice and its acidulation.

The following is M. Achard's own account of the process adopted by him. "The boiler having been well cleaned, the bottom is uniformly covered with chalk, finely powdered, in the proportion of about three drachms for every litre (61 cubic inches) of juice, acidified the day before.* It is then about two-thirds filled, that there may be room for the scum to form on its surface. The contents of the several earthen vessels are then got together, and poured into the boiler. The upper part of the acidified sugar is clear, but the bottom is thick, of a greyish color, from the flakes of albumen acd other impurities precipitated by the acid. The sugar is well mixed with the chalk, in order that the combination may be complete; for the object of this operation is to saturate the sulphuric acid which has been added to the sugar. It thus forms a sulphate of lime which is deposited at the bottom of the boiler. This precipitation is attributable to the insolubility of the lime, which requires 250 or 300† times its weight of water to hold it in solution. Such of it as remains in the sugar is separated by an after process.

"It would at first appear, that any sort of calcareous earth may be employed for this purpose; but experience proves the contrary. The true reason of this is, perhaps, that these calcareous stones are always mixed with extraneous substances, insomuch that their weight does not exactly indicate that of the calcareous carbonate; to say nothing of the obstacles which these substances interpose in the way of the clarification. By the combination of the sulphuric acid with the lime, the carbonic acid with which it is saturated is set at liberty and remains in the juice, sometimes showing itself in little bubbles. Experience has proved the necessity of disengaging this acid before refining, because the extraction of the sugar is thereby facilitated. The best means of effecting this, is by adding chalk converted into quicklime by the action of fire. If burnt beforehand, it should be carefully preserved from the effect of the atmosphere. The calcined chalk may be added to the juice in the boiler about a quarter of an hour after the unburnt chalk, at the rate of two drachms avoirdupois for every gallon of juice; the boiler is then covered, and the thermometer placed in it. When at 100° the cover is half taken off, and skimmed milk is added at the rate of 10 or 14 litres (2 to 3 gallons) per 1000 litres (227 gallons) of juice. The whole is well stirred, and then covered down. When the thermometer is at 79° (210°) the fire is extinguished, and when the temperature drops to 145° or 165°, the boiler is uncovered. Before the clarification, the albumen separated from

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* Observe, the juice is never put into the boiler till it has been in contact with the sulphuric acid about twenty-four hours.

†M. Achard states 470 times its weight of water; but we are assured by M. Dubrunfaut, that in beet-root juice it is much more soluble than in water, and that even in this latter it only requires 250 or 300 times its own weight to dissolve it.

the juice by the sulphuric acid, appeared in flakes too light to be divided from the mass, but, in consequence of the heat, this matter became consistent, an object to which the milk contributed not a little.

"All the particles separated from the juice floated on the surface, forming a dark crust, in one piece, easily removed with a copper skimmer. Underneath, the juice is found perfectly clear."

So far M. Achard, whose system has nevertheless been adopted but by one manufacturer, within the knowledge of the author, viz., M. Crespel d' Arras, who has, with some slight modifications, constantly pursued M. Achard's plan. The following is a brief sketch of

The Method of Defecation adopted by M. Crespel.

"The juice as it comes from the press passes, by means of a leaden strainer, into two tubs lined with lead. One of these is filled in the morning, the other at night. Each tub contains 1800 litres (410 gallons). As soon as one tub is filled, the first process is begun, namely, the acidification of the juice; for this purpose 8½ oz., or thereabouts, of sulphuric acid, diluted with three parts of water are used for every hectolitre (22 gallons) of liquid. As the acid is applied, the juice is kept stirring, after which it is left till the following day, when it is poured into the defecating boilers. Each of these ought to hold 410 gallons, that is, they should be of the same dimensions as the tubs where the juice has been acidified. The boilers having been well cleaned, the bottoms are lined with a coating of pulverized chalk, in the proportion of 18 oz. to 22 gallons. The juice is then poured in, stirring it well all the time, in order to prevent the acid from affecting the copper.* Into each boiler are then put 5 or 6 ounces of lime, previously slaked by the air, mixed with water enough to form a milk, which is mixed with the juice.

"When the fire is up, and the temperature in the boiler is raised to 25° or 30° of Reaumur, (88° to 100° of Fahrenheit,) bullocks' blood is added in the proportion of 2½ pints to every 20 gallons of juice.†

"The materials being well mixed together, the fire is forced briskly. In two hours the whole will be in a state of ebullition, as shown by the thermometer, which rises to 80° of Reaumur, 212° of Fahrenheit. The fire is shortly afterwards withdrawn, the scum, &c. is taken off the surface and put on a linen strainer, under which is a shallow tub or keeler, lined with lead, to receive the droppings, which are put back into one of the boilers. When they will yield no more juice through the strainer, the residuum is taken to the bags with the pulp, and pressed to get out what is left of the juice. This operation is performed by a press for the purpose, placed near the boilers.

"Shortly after skimming, the substances which did not float will be precipitated. The juice is then of a yellow color, and perfectly transparent. The cock is opened, and the juice contained in one defecating boiler is divided equally amongst six concentrating boilers." (Chaudières de concentration.)

Such is the plan which M. Crespel has pursued for many years, and which, with the exception of using large instead of small vessels for acidifying the juice, and blood instead of milk, is precisely that of M. Achard.

M. Crespel has since substituted simple lime for the carbonate of lime, to neutralize the acid, and has also discovered that the prolonged contact of the sulphuric acid with the juice is useless. The following is the method of defecation as at present pursued by him.

When one of the defecating boilers (always 1800 litres, or 410 gallons each,) is sufficiently full, before the fire is lighted apply 3600 grammes (127 oz., say 8lbs. avoirdupois) of diluted acid. After being well stirred, put in 8 or 9lbs. of lime, weighed quick, then slaked, and mixed with water to the consistence of milk. The fire is then lighted. When the juice is at 170° or 190°, the animal charcoal of a former clarification is mixed with it, after which bullocks' blood is added, which is well stirred, in order that it may be distributed equally throughout the mass. The fire is then quenched, and after a while the clear liquor is drawn off, by the cock placed a little above the bottom of the boiler.

M. Dubrunfaut then proceeds to give the results of various experiments made by M. Cafler and himself, which appear to have failed entirely from an oversight in applying the sulphuric acid to the juice when *hot*, instead of *cold*, as recommended both by M. Achard and M. Crespel. Still he had a strong desire to acquire farther information on this subject; and in the course of his investigations, the following reflections suggested themselves to his mind:

He had observed that both M.M. Achard and Crespel had recommended the defecation of the juice immediately on coming from the press. He had also noticed that the juice of the beet root, however white in itself, became of a dark and yellow tint when exposed to the air, and imagined this to proceed from the same cause which changes the color of fruits, as pears and apples, when cut with a knife. He conceived an idea that the sulphuric acid applied to the juice had for its object the prevention of this alteration, and to convince himself of it, exposed the sections of fruit to the action of the air, leaving some as they came from the knife, and touching others with a slight coat of sulphuric acid a good deal diluted. The former very soon turned yellow and blackish, whilst the latter remained unchanged. The experiment then was conclusive as to the object to be attained by the application of the acid.

Yet Achard had only advised the addition of sulphuric acid to the juice, and as the change manifests itself as soon as the pulp is formed, and in the pulp itself, he thought it would be an improvement to add the sulphuric acid to the pulp instead of the juice; with this view, the following experiment was made by M. Cafler and himself.

Experiment.—935 lbs. of beet roots were weighed, as being the amount of a single pressure. They were then rasped, and as the pulp fell into the trough beneath, it was taken and put into open casks, where it was mixed with sulphuric acid diluted with five times its weight of water. The

*This has been by some considered an erroneous idea, consequently such a precaution is useless.

†M. Crespel substitutes blood for the milk used by M. Achard.

quantity of acid so applied was 900 grammes (58 ounces.)

The pulp thus prepared, seemed to undergo no alteration from the action of the air; whilst, in general, it becomes black in a very short space of time. It was then put into bags, and from it were expressed 340 litres (77 gallons) of juice, which was preserved to the following day without any alteration; the temperature of the place being 12° Reaumur, 59° of Fahrenheit. The juice in this state was less muddy and milky than usual. Next day the juice was put into the boiler, and mixed with lime at a temperature of 20° to 30° Reaumur (78° to 100° Fahrenheit.) Defecation went on well, the evaporation was easy, the clarification was not more difficult; and the syrup, when boiled, yielded a small mould of sugar, rather smeary. The author does not attribute this clammy quality in the sugar to any defect in the process, but simply to the smallness of the scale on which the experiment was tried. Nevertheless, he is persuaded that they would have done better had the acid been neutralized when cold; and proceeds to give the following

Modification of Achard's System.

In the first place, the quantity of beet roots necessary for one pressure should be ascertained and measured. Enough of the sulphuric acid should then be diluted to serve for the whole of the pulp from the above, in the proportion stated by M. Achard of 2½ grammes per litre, equal to 5¾ drachms av. for 7 pints, say 3 oz., or thereabouts, for 7 gallons of juice. The cistern, lined with copper, intended to receive the pulp from the rasping mill, ought to be moveable, though of larger dimensions than usually made. Of these, there ought to be two or three, as will be explained hereafter. This done, the rasping should go on till the pulp cistern is full, which is replaced by an empty one. The pulp is then acidified in the manner before described, put into bags, and carried to the press. In this manner, one should be certain always to employ the same quantity of acid for a given weight of beet roots.

By such a mode of proceeding, the amount of acid remaining in the pulp is very trifling, it being nearly all expelled by the operation of pressing, insomuch, that the pulp may, without any inconvenience, be given to cattle.

It is important, in the progress of this work, to avoid iron utensils; and, indeed, all contact between the juice and iron under any form, for without this precaution, much unnecessary mischief may be done. Thus, all pumps should be made of copper; and where a hydraulic press is employed, which commonly has a good deal of iron about it, every part exposed to the action of the juice should be varnished or painted. Perhaps a varnish of caoutchouc would be the most effective. The acidified juice being taken to the defecating boiler, and whilst yet cold, a quantity of quick lime is added equal in weight to the acid used. After which, the fire is lighted, and forced as soon as possible to 65° or 70° Reaumur (178° to 189° Fahrenheit.) The bullocks' blood is then added, at the rate of a pint or so to 50 gallons of juice. After this it is left to settle, the clear is drawn off as before stated, and the process of concentration takes place.

(To be continued.)

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THE GREAT AGRICULTURAL DINNER AT MARKETHILL.

[The earlier stages of the agricultural improvements which are referred to in the following extract, (made by poor men occupying very small farms,) were given in detail in two interesting articles in the second volume of the Farmers' Register, at pages 706 to 709, and 724.]

This dinner took place on the 17th instant.

The Earl of Gosford being now in Canada, and Lord Acheson being detained in England, the chair was taken, about six o'clock, by William Blacker, Esq., his Lordship's land agent. The room was completely filled by the successful competitors, as well as by the principal tenants on the Gosford and neighboring estates, all of whom were invited, besides many strangers, who, taking an interest in the cause of agricultural improvement, had come from a distance to attend the meeting.

In the course of the evening the chairman announced that he had received a letter from the Marquis of Downshire, stating his Lordship's great desire to have been present, and that he had only been prevented by being under the necessity of attending the Down Hunt meeting. His Lordship, however, sent his agriculturist, Mr. Holland, and two of his principal tenants, Mr. M'Aleavy and Mr. Wesley M'Garry, very intelligent men, who added greatly to the pleasure and instruction of the evening. Mr. Poole, agent to the Earl of Ranfurley, came also from Dungannon, and Mr. O'Neill, from Verner's bridge. The agriculturists from the Richhill and Drumbanagher estates, and many gentlemen of the town and neighborhood connected with the Gosford estate, were present; as were also Captain Barker, Mr. M'Kee, Mr. M'Anally, Mr. Simpson, Mr. Martin, Mr. Scott, from the Charlemont estate, and many others. Altogether the room was quite full.

The cloth being removed, the chairman reminded the company of the established rules of the meeting that no subjects of a political or controversial nature should be introduced, nor any toasts given except what had been sanctioned by the chair; and, after having regretted the absence of his noble employers, he proceeded to give the usual standing loyal toasts. Then followed—"the lord of the soil, his Excellency the Earl of Gosford." It is almost unnecessary to mention the enthusiasm with which this toast was received. The chairman then addressed the company, as follows:

"Gentlemen—Having now gone through our standard toasts, I proceed to commence the business of the evening by reading out the list of premiums. It is, however, necessary for me to premise that the object of these premiums being to introduce a system worth following for *its own sake*, his Lordship has desired, that where any person has been already three times successful, he shall merely obtain a certificate of merit, and that the premium shall be given to the next in succession. I am happy to see that this change does not deter those who have been heretofore principally distinguished, from continuing in the course in which they had commenced. I still see the names of Messrs. Ingram and Bartley Kinney, and am confident I shall again see Moses Greer, in the list, when he gets his new farm into order. I am happy to see, also, many new names introduced of

persons who are coming forward as competitors, for the first time, and who will, I have no doubt, become better known to us hereafter.

"The premiums now to be awarded are for the best stock, and are adjudged upon a comparison of quality of cattle, quantity of food, and size of the farms; and the premiums consist of rollers, ploughs, fans for cleaning corn, harrows, wheelbarrows, &c., which it will not hereafter be necessary to enumerate." Mr. B. then read the names of the successful competitors, in the following order:

James Jenkins, of Drumgaw,	1st prem.
Bartley Kinney had certificate for	2d do.
Robt. B. M'Cantrim received, however,	2d do.
James M'Connell, of Cornicrew,	3d do.
James Collison, of Hamilton's-bawn,	4th do.
Samuel Parks, of Lurgyross,	5th do.
Joseph Thompson, Grayhilla,	6th do.

According to the usual practice, the health of James Jenkins was given, as having obtained the first premium; and he was afterwards called upon to state what advantage he had derived from the plan he was pursuing: this he did in a manner very satisfactory to the company. He said—

"I am able to say, gentlemen, that since I have followed the plan recommended by Mr. Blacker, I have been able to change my stock, with considerable profit to myself, from a very bad stock to a very good one, as my getting the first premium shows; and though I was then pinched to feed them poorly, I have now plenty to feed them well; and whereas I had only two cows, a heifer, and a pony formerly, I have now five cows, two heifers, and one good horse on my sixteen acres, kept on clover and vetches in summer, on cabbage at this season of the year, and turnips in winter and spring, I prefer early York and sugar loaf, and flat Dutch cabbage to the curled kail, for they give more food at this season; and if the plants are put in about three inches under the manure, the potatoes can be dug out without injuring them, and as they grow into the trench they do not overshadow or injure the potatoes, as the curled kail does. I am also happy to tell you, gentlemen, that I find the produce of my farm is increased, as well as my stock. Formerly I could manure but an acre and a half of potatoes, and that but indifferently, but now I have this year four acres of potatoes and turnips manured in the very best fashion; and you all know the more manured land you have in the farm, the more grain you will get out of it. Many gentlemen, from distant parts, have come to *see* my farm, and I am always glad to *see* them, and have always something pleasing to show them. Gentlemen, I have nothing more to say, but that I am well content, and determined to persevere in the plan I have now been so much the better of."

Jenkins having sat down, Bartley Kinney, of Ballyorgun, was called on. He said—"I have upon former occasions mentioned, that by following the practice of house-feeding and green crops, I have benefited greatly. I have added to my farm, I have added to my stock, and I have added to my crop; and although I am no longer allowed to compete for the premium, my certificate shows I am persevering in the same course, which I know is for my advantage."

Samuel Parks, of Lurgyross, being next called on, said—"I hold 4A. 2R. 20P. of land, at a rent of £4 9s 2*d*: upon this I feed two cows; and after providing my family, I have sold £7 worth of butter and milk, being one-half more than my rent. My cows are house-fed, and in capital condition, as my getting a premium shows."

After him, Joseph Thompson, of Grayhills, was called on. He said—"I have 11A. 3R. 0P. of land, and on this I have three cows, a heifer, and a horse. The half of my land was formerly in grazing, and my stock far inferior in number and condition. I consider the four-course rotation as an excellent plan, and mean to persist in it; and I think I will be able to increase my stock next season from the fine appearance my clover now has."

I should have mentioned that before calling on any of the premium men to give any statement as to their farms, the chairman cautioned them not to say anything they could not prove, as, most probably, if the day admitted of it, some of the strangers would visit their farms. The premiums for stock having been gone over, the chairman remarked, that as so much in the management of stock depended on the females of the family, he had formerly been in the habit of giving as a toast, "farmers' wives and farmers' daughters," but he would now make some little alteration, which, he hoped, would not be displeasing to the company, nor yet to the parties more immediately referred to. He would, therefore, call on them to fill a bumper to this toast—"may those who are *wives* be long so, and those who are not be soon so." This the company insisted on drinking with all the honors of three times three.

The chairman then introduced the reading of the premiums for the best cultivated farms, according to the four-course rotation, by stating that the smallness of the quantity of land kept in grazing proved in a great degree, the profitable occupation of the rest of the land, and mentioned that the certificate had been given to Mr. Thomas Ingram, of Drumhoney, who I have, in former accounts, had often to mention.

The 1st premium was awarded toMichaelClarke, Hamilton's-Bawn.

2d do., divided between Ruth M'Connell, Drumblack, and Robert M'Cammon, Drumminis.

3d, John Hogg, Drumgaw.

4th, Edward Wallace, do.

5th, James Ralston, Drumminis.

The list being read out, the chairman reminded Mr. Ingram, who had got the certificate, how doubtful some of the company were formerly about the produce of his dairy, and asked him had he now the same thing as then to say about paying his rent thereby?

Mr. Ingram, being thus called on, said—"Gentlemen, I cannot only say the same thing, but I can say better; I hold twenty-three acres of land, and nobody can say that I hold it too cheap, when I tell them I pay £25 a-year rent. My stock is seven cows, two heifers, one calf, and two horses, and they are all in good condition; the butter has already produced £26, which is a pound over the rent, and I expect to make it £30 before the year is out, as the price is so high. And I will tell you more, gentlemen, I had nine hundred stooks of excellent oats and an acre of flax, and all nearly in and well saved, so that I could make four times my rent off my farm."

This account seemed to give the greatest pleasure to all present, and Mr. Ingram's health was

drank most cordially. The mention of the produce of Mr. Ingram's dairy afforded much surprise, as he keeps three farm servants, and must, therefore, have great consumption at home. The chairman, however, said he understood there was another in the list that would surprise them still more. He then passed a high encomium on Michael Clarke's farm, in which, he said, there was not the space of a single foot neglected; and also noticed Ruth M'Connel, who, by her own exertions, had made a small piece of ground (which had merely fed a goat before, and never yielded more potatoes than lasted until Christmas,) now to keep a cow right well, and supply potatoes for the whole year, and made 12 cwt. of oatmeal besides, from a rood and six perches of land—adding, that he was glad to hear her industry had got her a husband. He then called on John Hogg, of Drumgaw, who bore the same testimony as all others—viz: to the increase of his stock from one cow and a heifer to two cows, a heifer, and a horse; to the increase, likewise, of the manure, and the increase of his crop, and his intention to persevere in what he found so beneficial. After him, James Rollston, of Drumminis, was called on, to whose profit, by butter, the chairman had alluded. He stated that "he had 8½ acres, and that he had made, by selling milk and butter, £16, and by exchange of cattle, £2; that he had also the produce of four bushels of flaxseed (near two acres,) and one hundred and thirty stooks of oats: his stock consisted, through the summer, of two excellent cows and a pony; he had saved off his clover and rye grass, four small cocks of hay, sufficient to make one six fathom cock, and had at present likewise two sheep." The chairman here drew the attention of the strangers, and, indeed, all the company, to this extraordinary produce from only two cows—and Mr. Rollston was questioned very closely as to how he could realize so much by his milk and butter; when it was explained that he lived within about 2½ miles of Armagh, and sold his fresh butter there at 11d the pound, and his buttermilk at ½d per quart; and calculating at those prices it appeared that the money might very readily be made.

Mr. Herd, steward at Gosford, here observed, that good keep the previous winter tends greatly to increase the milk the following summer, which all seemed to agree in.

Mr. William Martin, addressed the chairman, said that "John M'Connell, close to Gosford, had made £6 from one cow, which was as much in proportion, and that he had improved his farm as much as any one on the estate."

The chairman said he was fully aware of what had been mentioned—and, to prove the fact, he read a portion of a letter he had received that day from the Earl of Gosford, from Canada, in which his Lordship writes—"Do not forget to tell Jockey M'Connell (the name he is known by among his neighbors,) how glad it made me to hear of his improvements in the management of his land." "Now," observed the chairman, "this extract shows you all, gentlemen, how willing and attentive I have been in reporting the improvement Mr. Martin has alluded to; and it also shows another thing, which I alluded to in proposing his Lordship's health, namely—that although he might, in person, be far away, yet his heart was with us. In this statement I am, I think, fully borne out, by the kind interest he has shown in his humble tenant's improvements, at a time when he himself, as we all know, must be vexed and disheartened by the difficulties and annoyances which faction and party spirit throw around him."

Mr. Bruce here said, that he knew John M'Connell had made more by his cow than Mr. Martin thought; he having sold two firkins of butter, and they must come to more money than £6.

The chairman here alluded to the great produce Mr. Ingram had derived from his farm, and added, "I am fully aware that this is not to be obtained by him, or by any other person, without very considerable additional labor; for, when the whole surface is under a course of cropping, it must naturally take more labor than when the half of it is in grass; but is it not evident that this labor is well remunerated? and what has been the complaint in Ireland for centuries, but a want of employment, and a want of remuneration for such employment as did offer? Here, then, seems to be the means of removing the complaint which has so long existed; and I must say, that many landlords from different countries in Ireland, seeing the thing, I suppose, in the same light in which I have represented it, have been anxious that I should send them persons from this, to take farms upon their estates; but this plan of introducing better examples of industry has hitherto failed, from the apprehensions which people here entertain for their personal safety, in going among strangers, who they may chance to find hostilely disposed towards them: but it just occurs to me that the thing might be accomplished in another way, without any chance of failure, and I mention it here, in order that the idea may gain publicity. We all know that in Scotland, farmers who have acquired a reputation for skill and good management, are in the practice of receiving apprentices, with very considerable fees, for being taken into the family and allowed to labor on the farm, and learn a proper system of cultivation; and I really cannot help thinking that any landlord in the southern countries, who wished to have some of his tenants' sons properly instructed, should have recourse to the Scotch plan, and send them down as apprentices to such men as Mr. Ingram, or to such agriculturists as Mr. Bruce, Mr. Anderson, or Mr. Milne, where they would be taken round an estate of, perhaps, many thousand acres, consisting of every kind of soil, and might thereby receive much more general instruction than they ever could do in any agricultural school or any single farm whatever, and become qualified to act, on their return home, as agriculturists." This idea seemed quite new to the company, but they all appeared sensible of its great utility if carried into effect. Capt. Barker here said, that he knew the interest taken in the southern countries, as to the agricultural improvements carried on in this neighborhood, was greater than could be well imagined; and that a friend of his, from the county of Cork, would have been very happy to have been able to attend the present meeting.

Mr. W. M'Garry, from Lord Downshire's estate, also observed, "that Mr. Ingram's name had gone farther than ever he could go himself; for he took many English and Irish farming publications, and in all he had seen mention of Markethill, and of him and others who were distinguished as premium-men."

Mr. M'Aleavy, from the same estate, here rose and begged to remark, that he had an objection to the four-course rotation, which was getting so much into use here, and that he found the five-course more desirable, as by letting the land lie under clover and grass a second year the land got more rest.

The chairman defended the four-course-rotation, by showing, that if, as Mr. M'Aleavy said, the five-course gave more rest, the four-course gave more manure; that the same stock could not be kept on the five-course, nor the same number of cattle would not yield the same quantity of manure, on account of the loss by being pastured in place of being house-fed; likewise, that the grain crop, after clover which had been soiled, was always better than what was grazed. Mr. M'Aleavy did not at first admit this; but the chairman showed that, under the four-course system, the half of the land was under grain, but in a five-course, one-fifth being always under pasture, and another fifth applied to soiling, there could only be three-fifths remaining for grain and fallow crops, as potatoes, turnips, &c., in place of three-fourths, which would remain for those crops under the four-course. Mr. M'Garry having expressed his opinion as to the crop after clover which had been mowed, being better than after it had been pastured, Mr. M'Aleavy conceded this point, but still seemed impressed in favor of the five-course rotation, in which several of the company seemed to join, though Mr. Bruce, Mr. Ingram, and Mr. Jenkins all agreed that their land had greatly improved in quality since the four-course system had been adopted.

Mr. Simpson, an experienced independent farmer, expressed his belief that the quality of some lands might suit one course, and that of others a different; and Mr. Blacker acknowledged that in Berwickshire the five-course was in use; but, in regard to Berwickshire, the farmers, by sowing their turnips, which may be said to be their entire fallow crop, on bone dust, keep their farm-yard manure for top-dressing their clover, which makes the second year's growth more productive; and the use of turnips in fattening, by stall-feeding in winter, with the quantity of bone dust, more than makes up for what is lost in the manure by grazing; so that a Berwickshire farmer had said that he manured *half his entire farm every year.*

Mr. Blacker, in his pamphlet, suggests that it is not the turning of the land, but the scourging crops put in where the land is turned, that does the mischief: and he instances that land after being turned five, six, or seven times in fallowing, will give a good crop, when without this turning it would have yielded nothing. I am inclined to be of this way of thinking, for it is a common expression to say of a farm that it is "as fruitful as a garden," as describing the perfection of agriculture; but a market gardener makes his land produce four or five crops in the year, and is turning it perpetually, and this near all large towns has been going on for centuries. I therefore am inclined to believe the turning of land is not so prejudicial as people think, and I believe in the counties of Norfolk and Suffolk, where the four-course rotation has been many years practised, the soil is improving.

Mr. M'Garry, without giving any decided opinion on the subject in discussion, begged to call the attention of the company to the danger of sowing clover too often under the four-course system, and recommended, from his own experience, that only part of the manured land should be sowed in clover, and the other half reserved for vetches, and by altering these two crops, the summer feeding might be kept up, and yet the clover would not come round to the same land in less than seven or eight years.

In this the chairman coincided, and said it entirely agreed with the instructions given by Mr. Bruce, but he was afraid it had not been enough attended to, as clover was, in fact, but a new crop, generally speaking, and the four-course system had not been long enough in use to bring the thing to the proof in this neighborhood. He therefore strongly recommended this hint to the attention of all present; and after thanking Mr. M'Garry for the suggestion, he proposed as a toast "live and learn." He then proceeded to read the list of successful competitors for the best turnips: when it appeared that Mr. Bruce had the certificate for the best crop. The first premium, however, under the new regulations went to Robert Mitchell, Drumbucross; the second to Jonathan Cochran, Cabra; the third to Thomas Singleton, Drumblack; the fourth to Joseph Forster, of Ballyorgan. The chairman, in giving the health of Mr. Bruce, requested him to say how it happened that his field of turnips was quite green, without a single yellow leaf, and Mr. Singleton's at the opposite side of the road, was quite yellow with the number of leaves that were decayed.

Mr. Bruce—"Gentlemen, this is very easily accounted for. Mr. Singleton and almost all others think, when the leaves begin to cover the ground, that the horse-hoe or pony-plough is no longer necessary, and that the horses travelling through will injure the crop. Now, I think the reverse; and I ran the pony-plough three times through mine after they had attained the growth that Mr. Singleton and others stop at. The consequence is, that mine are still in the height of their growth, and will grow on until Christmas, whilst their's are stunted, and will not yield within one-third of the weight they would otherwise have done."

The chairman here adverted to the advantage of turnip feeding, and expressed his surprise that so many people would be so blind to their own interests as not to see the advantage of it. He stated that a rod of well cultivated turnips would yield from eight to ten tons, or even much more, supposing the crop to be part white, yellow, and Swedish. This, therefore, would give from eighty to one hundred pounds a day for a cow for seven months, or two hundred and ten days. Now, even a springer will give two quarts of milk more upon turnips than upon either hay or straw. A stripper might increase four, and a new calved cow would give seven or eight quarts more; but taking it at two quarts, which is the lowest, these two quarts are worth 2*d* per quart all the winter and spring; and 4*d* per day for two hundred and ten days is exactly 70*s* gained in extra milk by one rood of turnips, which is £14 to the acre. Thus the extra of quantity pays £14 per acre for the turnips, and you have all the cow would have given without them for nothing, or next to nothing, and the manure besides. This is as plain as that two and two make four, and yet it would appear that people could not see it.

Mr. Parks here rose and said, he had bought a

springer that did not give two pints, and upon giving her turnips she gave four quarts.

Robert Mitchell being next called, said his farm formerly produced him no more than about £8 16s, which was the rent he then paid: he now had to pay more, but by the new system he had last year made £44 5s 4d out of it, leaving plenty of food for himself and nine of a family. He had also encreased his stock from one cow to three cows and a horse; and he saw clearly that by going on as he was doing, he could have three times as much potatoes, oats and flax as ever he had formerly.

"The Soiling System, cut and come again," was then given.

The premium list for rape was then read over, by which it appeared—

Mr. Anderson, of Drummard, got the 1st prem.
Edward Coyne, of Drumgaw, the 2d do.
Thomas Scott, of Dirlet, the 3d do.

Mr. Anderson bore testimony to the advantages he had derived in the increase of his stock and crops. He stated he had sowed his rape in August, after flax, and that he had saved this year twenty-five bushels of winter vetches seed from less than an acre of land.

The chairman here pointed out the necessity of early sowing both rape and winter vetches, and that not a moment should be lost in putting them in even, ridge by ridge, as fast as the ground could be cleared of the crop preceding—observing that a week in August was worth the whole month of October. He also noticed that Mr. Anderson had made near £12 an acre by his vetches, and recommended the more general sowing of that crop for seed.

Mr. M'Kee, the vice-president, here took the opportunity of the premium sheet being ended, to give the health of "Lord Acheson," which was received by the company with the strongest manifestation of attachment. The chairman said the dinner had been long postponed on account of his Lordship's desire to be present; but after the day had been fixed, he had been confined by a severe cold which prevented him from travelling, and confined him to his room.

"The unsuccessful candidates, and better luck to them next year;" and "the judges of the day," were given as toasts by the chairman, after which succeeded—"Mr. Poole, and our other agricultural friends who have honored us with their company in such dreadful weather."

Mr. Poole returned thanks and expressed the most anxious desire to unite in promoting the improvement of agriculture by every means in his power.

The chairman here premised that he was afraid he might be accused of remissness in not giving at an earlier period the health of the Marquis of Downshire. He certainly was entitled to every compliment which the meeting could pay him, not only from his wish to have honored them with his company, and having sent his tenants to join them, from whom they had received such valuable suggestions, but also from his personal character as a resident landlord, and his early endeavors to promote education and agriculture, when other landlords were in most cases indifferent to both.

The "health of the Marquis of Downshire" was then drank with three times three, and was ably responded to by Mr. M'Aleavy, who bore most satisfactory testimony to the many good qualities of his landlord.

"Live and let live" was then given from the chair; after which Mr. M'Kee gave the health of "the chairman, William Blacker, Esq.," introducing the toast by many compliments to that gentleman upon the success of his efforts in promoting the agricultural improvements of the Gosford estate.

Mr. Blacker, in reply, said—"Gentlemen, I have upon many former occasions endeavored to express the grateful sense I have always entertained of the kind reception which the toast last drank has constantly met with from this meeting; and I may safely say, that at no former period has this feeling been exceeded, or my gratification higher, than at this moment, however imperfectly I may be able to give those feelings utterance. I see, or I think I see, in the kindness shown towards myself, as well as from what has fallen from my friend Mr. M'Kee, the interest which you take in the success of that system which I have advocated, and from the success of which have arisen those statements of increasing comfort and prosperity which must have afforded you all so much sincere pleasure to hear. I trust therefore, as friends to the cause, you will allow me to say a few words in its defence, against those charges which are sometimes brought against it, and which lead many to doubt of its eligibility. The charges I allude to are these; that by allowing these small farms, the population will be increased, until the country shall be overwhelmed with inhabitants; and secondly, that the system, on this account, tends to such minute subdivision of land, that the farms will be at last reduced to mere pauper allotments. Many sensible and well-meaning men hold these opinions; but *no such consequences* are, in my mind, to be apprehended. In alluding to the first charge, I must beg to have it recollected, that the population any landlord has now to deal with is a population already in existence, and, therefore, not chargeable against the system we are alluding to, the operation of which must refer solely to the *future*. Now you have heard the declarations of those who have been most successful in adopting it, as to the increased comfort and prosperity they have enjoyed thereby; and if you examine the reports of the different poor law commissioners, and official documents, of every kind, you will find it proved by all concurrent testimony, that the population increases in direct proportion as *poverty exists*, and that the possession of comfort in their fathers' cottages deters young people from forming imprudent and early matrimonial connexions, by which those comforts will be forfeited. If you look round in the society, you will find that, as the scale ascends, the more cautious and considerate are the parties in forming matrimonial engagements—so that, in exact proportion as you increase the comforts of their parent's home, young people are the less disposed to forfeit them by having families of their own, without the means of supporting them. Therefore, you see, my friends, by giving people a greater taste for comfort, you check early marriages, and consequently check that increase of population, which is erroneously brought as a charge against us. Now, let us see how the charge is met as to the subdivision of farms; and here I have no occasion to enter into theories or conjectures, but merely refer

you to facts which are perfectly well known to almost every man present, strangers excepted. What I allude to is this; that there is not a man who has distinguished himself by his advance in the system who has not *enlarged* his farm by that means, or if not, is only waiting for an opportunity to do so. You all know Moses Greer; you know he began upon four acres of land—he has now in his possession above nineteen acres: the greater part of it held by an old lease, at a low rent, and when he gets it into heart it will be worth £200 to £250. He is, in fact, re-uniting parts, I think, of the same lease that had been years ago divided. Within a short distance of him is Bartley Kinney, who has added about ten acres to his farm. Then there is Rollston of Drummins; he has re-united the farm he lives upon, and has got double what he had, and is now in treaty for more. John Hogg, of Drumgaw, in like manner; Thomas Scott, also, and many others; but these men are here present, and ready to answer any questions that may be asked them. It is true the landlord has assisted their exertions, but they have repaid him, and any landlord is blind to his own interest that lets an honest industrious tenant want any help he can reasonably ask. I mention these because they are in company, but there are scores who are coming forward, year by year, who are all upon the look-out to add to their farms. The fact is, capital will always find a place for itself somewhere or other, and the man who has more money than his place will employ, will soon buy from his neighbor, or fit himself elsewhere.—Whoever removes, we may be sure it is to benefit himself, and those who stay behind have the opportunity of increasing their holdings by the addition of what he leaves; this is the natural effect of the prosperity of any tenantry—as they get capital, they become quite as anxious as their landlord to have their farms enlarged, and with the desire they have also the means. The examples you have before you show this to be the case, and I would fondly hope that landlords everywhere would be convinced that the natural tendency of every improvement in agriculture, goes to the accomplishment of their wishes for the enlargement of their farms, and that they will turn their minds to effect what they so much desire, by this means, and wholly abandon the clearance system which some may have adopted, however contrary to their feelings, in despair of accomplishing their object in any other way. These facts and arguments will, I hope, tend to do away prejudice where it may still exist; but I am happy to say, from the number of applications I have for agriculturists, that all prejudice is fast declining, and I expect, before long, to see the plan we are following, or some modification of it, universally adopted. From the interest I take in its success, I fear I have detained you too long, but I trust you will pardon me, and that we shall all live to another anniversary, and be able to congratulate ourselves on its further extension. I think I know, myself, of between sixty and seventy agriculturists having come over from Scotland, and it is not too much to suppose that I am not personally acquainted with the one-third of those who may have been engaged for the purpose of improving estates; and as they are generally placed on large properties of ten to fifteen thousand acres, it is not perhaps going beyond the mark to say that there must be in Ireland from a million and a half to two millions of acres, upon which the system is more or less in progress, and I have at this moment orders for five more agriculturists, whom I have not yet been able to procure. The chairman here concluded by giving as a toast "the town and trade of Markethill."

The chairman then gave, as a toast—"the improving tenants on the Charlemont, Richhill, and Drumbanagher estates"—which was replied to by Mr. Anderson, who mentioned the encouragement given to the Richhill estate, both by reduction of rents, premiums for crops, and assistance in repairing houses. He also mentioned that since the return made last year, the house-feeders had increased upon the estate fully one-third.

THE PATENT RETARDER, OR IMPROVED DRAG.

The object that the projectors of this contrivance have in view is to obviate the danger and risk that passengers are exposed to, whether travelling by stage coaches or other vehicles, when descending hills, or in case of the horses of their carriage becoming unmanageable, restive, or running away. On Tuesday afternoon a number of trials were made, with a view to test the efficacy of this invention, by running a stage coach with the retarder attached to it, (with and without horses,) up and down Highgate hill, and the result was most satisfactory. To a casual observer there is no essential alteration in the appearance of a coach to which the retarder is attached, and certainly it adds no great weight to it: but by its construction either the coachman or the guard, and indeed any person in the rear of the coach, by the pressure of the foot on the spring arising from this machine, and without alighting, can retard or stop the progress of it at pleasure. The principle of this machine, as we understand it, is, that by increasing the pressure on the boxes of each of the hinder wheels the friction is increased to such an extent as to stop the progress of the vehicle. This is managed by means of a lever with springs acting above and below the box of each of the hind wheels, and, as we before observed, can be applied by any person on the top of the coach. As far as we were enabled to judge of the merits of this invention from the trial of Tuesday, we were perfectly satisfied of its utility. Every person who has travelled to any extent must be aware of the inconvenience and danger that results from the pressure of a heavily laden coach on the horses in descending a steep hill; but by means of the retarder the coach can be stopped, or its progress regulated at pleasure, almost imperceptibly to the passengers, or the machine can be applied in a manner to operate as an additional draft of several tons. Again, on ascending a hill, a coach can be stopped at pleasure by means of this invention, so as to prevent its running back. At the same time the recurrence of those accidents can be prevented which so often arise from the coachman, on leaving his box, placing the reins in charge of a passenger or horsekeeper. The proprietors of this machine contend that the adoption of it by coach proprietors would be attended with considerable pecuniary advantage to the latter; of this, however, we are unable to express an opinion, but we have no hesitation in stating that the gen-

eral application of it to stage coaches would be attended with considerable advantage to the public, both as regards the safety and convenience of travellers, and at the same time much time would be saved in a long journey which is now lost in stopping the coach to apply the drag. The experiments are to be repeated this day and to-morrow, at the hours of 11, 1, and 3 o'clock, at which times the coach, with the retarder attached to it, will leave the Archway Tavern, at Holloway, to ascend Highgate hill. The patentees of this most useful machine are Messrs. Makepeace and Pearson, of Mitcham, Surrey, and the merit of the invention is due to the former of these gentlemen.

[*Ib.*

OLD ENGLISH FARE.

The following is a dinner of the reign of Charles the First. A soupe of snayles, a powdered goose, a joll of salmon, and a dish of green fish, buttered, with eggs; this was a first course. Then came a Lombard pie, a cowe's udder roasted, a grand boyled meat, a hedge-hog pudding, a rabbit stuffed with oysters, polonian sausages, a mallard with cabbage, and a pair of boiled cocks. To these succeeded as *entremets*—a spinnage tart, a carbonated hen, a pie of aloes, eggs in moonshine, a christal jelly, jumballs, quiddany, braggat and walnut suckets. Cockale, surfeit-water, canary, sack, and Gascony wines, served to moisten this heterogenous repast. The following is taken from "Wrecker's Secrets of Nature," published in the next reign, 1660. *A live roasted goose.* The details of the process are too barbarous to repeat, but when the roasting is accomplished the writer adds: "then take her up, set her before your guests, and she will cry as you cut off any part from her, and will almost be eaten up before she is dead; *it is mighty pleasant to behold.*"—*Ib.*

From the N. Y. Express.

EXTENSION OF BEET SUGAR CULTURE IN EUROPE.

Extract of a Letter from Paris.

The Chamber of Deputies has not yet entered on the discussion of the bill for reducing the impost duty on colonial sugar in order to enable that article to compete in the French markets with the beet root sugar. They appear determined on amending it in a manner calculated to secure the interests of the two parties. M. D***, a gentleman from Albany is here very industriously engaged collecting the necessary information on the best mode of extracting sugar from the beet, with a view to establish a manufacture of the kind in the neighborhood of Albany. That precious industry has now extended *over almost the entire of Europe*, having even penetrated into *Russia*, where it is daily acquiring an immense extension. In Moscow, and the adjoining governments, the richest, most populous, and most interesting in the empire, the number of beet sugar manufactories, established in the last five years, amounted on an average to 40 per annum. The cultivation of flax has been abandoned in many parts, and the proprietors give premiums to their peasants to induce them to substitute the beet root in its stead. Only a few manufactories have yet been established in southern Russia. It was a Polish lord, now a refugee in Paris, who, ten years ago, was the first to introduce on his estates of Podolia the culture of the beet, and to extract sugar therefrom. His undertaking shared in the fate of its founder; his property having been confiscated, his manufactory ceased to exist—but the country, alive to its advantage, has benefited by the example. The impulse has now been given throughout that vast and fertile region stretching between the Danube and the Don. *Some of the wealthiest land owners have become planters and manufacturers of beet root.* One of them, who commenced eighteen months ago, and only obtained 1000 pounds of sugar in 1836, expects this year to manufacture 100,000 pounds. In the course of 10 or 15 years, New Russia will not only grow a sufficient quantity for its own consumption, but also for the supply of European Turkey. The price of labor, which may prove in America a serious obstacle to the success of this branch of industry, is a matter of no consideration in Russia, where *white* slaves cost perhaps less to maintain them, than the black of the United States.

From the New York Observer.

GENERAL REMARKS ON THE IMPROVEMENTS AND PROSPECTS OF BRITISH AGRICULTURE.

Extract from Dr. Humphreys' Letters from England.

I have spoken already, in general terms, with a little of that enthusiasm, perhaps, which first impressions are apt to beget, of the moral beauties and high cultivation of England, and parts of Scotland. A glance, in July or August, from a few of the thousand eminences which invite your steps, is sufficient to convince you, that the prodigious agricultural resources of the country are developed with extraordinary industry, skill and success. But these enchanting glimpses, are too rapid and indefinite, to afford any satisfactory data, from which to calculate the gross produce of the island. You want to sit down in your closet, with such statistics as may be gleaned from the reports of parliamentary committees and other authentic documents, and by the help of these, to make out a condensed abstract, embracing all the items which go to swell the vast aggregate of British agricultural production. For brevity's sake, I shall include what I have to say of the agriculture of Scotland under the present general head, although most of the estimates will have more special reference to England and Wales.

It is the opinion of competent judges, that the advances made in the agriculture of Great Britain during the last *seventy* or *eighty* years, are scarcely exceeded by the improvement and extension of its manufactures, within the same period; and that to these advances, no other old settled country furnishes any parallel. That they have been very rapid, indeed, the following figures and comparisons abundantly show. In 1760 the total growth of all kinds of grain in England and Wales, was about 120,000,000 of bushels. To this should be added, perhaps 30,000,000, for Scotland—making

a grand total of 170,000,0000. In 1835, the quantity in both kingdoms, could not have been less than 340,000,000 of bushels. In 1755, the population of the whole island, did not much, if any, exceed 7,500,000. In 1831 it had risen to 16,525,-180, being an increase of 9,000,000 or 120 per cent! Now the improvements in agriculture, have more than kept pace with this prodigious increase of demand for its various productions; for it is agreed on all hands, that the 16,500,000, or rather the 17,500,000, (for more than a million have been added since 1831,) are much fuller fed, and on provisions of a far better quality, than the 7,500,-000 were, in 1755. Nor is Great Britain indebted at all, at present, to foreign markets for her supplies. Since 1832, she has imported no grain, worth mentioning, and till within the last six months, prices have been so exceedingly depressed, as to call forth loud complaints from the whole agricultural interest of the country. England is, at this moment, so far from wanting any of our bread-stuffs, if we had them export, that she has been supplying us all winter liberally from her own granaries, and according to the latest advices, she has still bread enough, and to spare. Again, it is estimated by British writers, of high authority, that the subsistence of 9,000,000 of people costs, in raw produce, no less than £72,000,000, or £8 for each individual per annum. According to this estimate, the annual product of this great branch of national industry is $350,000,000 more at present, than it was in 1755; which is more than twice the value of the whole cotton manufacture of the country, in 1831. Now if it costs $350,000,000 to feed the increased population of 9,000,000, then to feed the present population of 17,500,000, must cost near $700,000,000! What an amazing agricultural product, for so small a territory! And yet, it is the opinion of practical men of the highest respectibility in England, that the raw produce of the island might be well nigh doubled, without any greater proportional expense being incurred in its production. That is to say, 35,000,000 of people might draw their subsistence from that one little speck in the ocean! Now *we* have a territory, more than fifteen times as large as the island of Great Britain; and what should hinder it, when it comes to be brought under no higher cultivation than some parts of England and Scotland, from sustaining a population of *five* or *six* hundred millions of people? This would give to Virginia something like *thirty* millions—to Illinois and Missouri about the same number, each—to New York near *twenty-five* millions, and so in proportion to the other states. I am quite aware, that this estimate will be regarded as extremely visionary and incredible, by many of your readers; but not more so than it would have been thought in the middle of the last century, that England, Scotland and Wales could ever be made to sustain thirty-five, or even thirty millions.

Among the causes which have more than doubled the agricultural produce of Great Britain, within the period just alluded to, may be mentioned the enclosing of six or seven millions of acres of commons and common fields, by which their annual product has been increased, in many cases more than tenfold—the cultivation of heaths and other waste lands—the redeeming of extensive and inexhaustibly rich fens, from the possession of aquatic birds and animals—the great improvement in agricultural implements—the furrow draining of clay and other cold and stiff soils—the better rotation of crops—the extensive introduction of turnips and clover—the immense increase of common manure, and the introduction of one at least, whose extraordinary nutritive qualities have but recently been discovered. Next to wheat, the turnip crop, which forty years ago was hardly worth mentioning, is now more valuable than any other, both to landlords and tenants. It is used chiefly in feeding and fattening cattle and sheep: and while immense numbers of both are kept in the most healthy and thriving condition upon this vegetable, one species of which, the ruta baga, has lately been introduced and is extensively productive, the lands are greatly enriched and soon prepared for any other crop, which the farmer may find most profitable in his system of rotation. Clover, too, is doing much to enrich the soil of England and Scotland, and to reward the labors of those who moisten it with the sweat of their brows. It is surprising to see, to what an extent the light sandy lands of England have already been redeemed from comparative sterility under this cultivation, and are now sowed with the finest wheat. The process is still going on, and bids fair to proceed as long as there remain any such lands to be reclaimed and enriched. Indeed, who can tell how much the cultivation of the turnip may ultimately add to the wealth, and help to sustain the population of Britain. According to an estimate which I have lately seen, it is now worth *many millions* sterling, per annum, to the single county of Norfolk. *Carrots*, also, are found to be a very profitable crop in some parts of England, and the farmers are turning their attention to the cultivation of this very nutritious esculent, with increasing interest and advantage.

Among the several kinds of manure which have long been in high repute, lime and marl are inexhaustible; particularly the former, which the low price of coal brings at a cheap rate. On some soils, and near the kilns, it is used in great quantitities. I have seen fields covered with it, just as ours are with barn manure; and when it is spread, the ground appears, at a little distance, as if it were covered with snow.

But the richest and most profitable kind of dressing which has yet been tried, and which is a new source of agricultural wealth to Great Britain, is *bone manure*. It began first to be used, on a large scale, in Yorkshire and Lincolnshire, where its influence has been all but miraculous! Extensive tracts of country, which a few years ago were mere wastes, occupied by rabbit warrens, have been converted into some of the finest and best managed farms in England. This signal improvement, though it did not begin, has been carried to its present perfection, by the use of the manure just mentioned. Since bone dust has come into general use, the turnip crop has been increased in many instances, tenfold, and in few less than *four* or *five* fold, and the effect has been equally surprising upon the succeeding crops of grain, on the same land. This is the testimony of practical men, well acquainted with all the circumstances, and they have no doubt that the soil will go on progressively improving, and requiring a less quantity of bones, annually, from its increased fertility and power. It answers best on

light soils. A single farmer in Lincolnshire, is said to have generally about 600 acres dressed, almost entirely with bone manure, furnishing a vast supply of food for cattle, and of common manure for other lands, and is fitting those on which it is sown for bearing the most luxuriant crops of wheat and barley.

In Scotland, the use of bone manure is still more recent, but scarcely less productive. In the Lothians, in Berwickshire, and in fact everywhere, it is working wonders. Being so light and easily transported, compared with any other kind of manure, many a rugged and hilly tract is fertilized by it, which must otherwise have remained in a state of nature. To pulverize the bones, mills are constructed in the vicinity of all the large towns, and besides what their own markets furnish, large quantities of bone dust are imported by the Scotch farmers.

I am almost ashamed to offer your readers this brief and meager sketch of the present state of British agriculture; but neither time nor space, will permit me to enlarge. There are limits, no doubt, beyond which improvements in cultivating the soil, cannot be carried. But there is no reason to think, that these limits have yet been approached, even in the most productive districts of England and Scotland—for the science of agriculture never advanced more rapidly than it has done within the last few years; or rather, I should say, were I entitled to speak with any authority on the subject, it seems to be almost in its infancy. Who that looks at the astonishing improvements of the last fifty years, both in the science and the art of husbandry—who that recollects how lately the potato, that most rich, nutritious and productive of all our farinacious esculents has been brought into general use, who that considers what inexhaustible sources of nutrition and fertility and wealth, the turnip and other green crops have so recently become in Britain, will undertake to say, that other vegetables, still more nutritious and productive, may not yet be introduced and brought under general cultivation? Who can tell, what new substances scientific and practical agriculturists may yet find, possessing far higher fertilizing virtues, than any now in use—or what combinations and mixtures chemistry may furnish, so cheap and so abundant, as to put a new aspect of fertility upon lands already most productive? Who, in looking at the best acre in all England, would venture to say, that it can never, by any possible improvements and discoveries, be made more productive of human sustenance than it now is? Who knows, but that a hundred, or a thousand years hence, it may yield four fold? Who, in short, can even conjecture, what amazing undeveloped agricultural resources yet lie hidden in lands, which have hitherto been regarded as scarcely worth tilling at all? * * *

From the Farmers' Magazine.

MANAGEMENT, &C. OF THE HORSE.

Shoeing.

Nature never intended that the foot of the horse should be bound with a rim of iron; but as this beautiful quadruped has been taken from his native wilds, reduced to subjection by man, compelled to receive education, and has become, in fact, a semi-domestic; so, it may be remarked, that this change from the state of pristine nature to an artificial system of existence, necessarily introduced artificial accompaniments—hence, the horse-shoe.

In some countries, where the horse is rendered as domestic as possible, (as in Arabia for instance) shoes are not used; but if these horses were brought to this country, our hard paved roads would render the shoe indispensable. Therefore, since shoes are absolutely requisite where the roads are hard, the object of consideration is, to ascertain, if possible, that form of shoes best calculated for the purpose, and the most correct mode of applying it to the foot:—no very easy task, certainly. Various *alterations* have at times, been made in the form of the shoe, which have been called *improvements* by the inventors, and which have acquired strenuous advocates; whose utmost exertions, however, were unable to support their evanescent pretensions; they have been laid aside for the most part, if not altogether forgotten. Yet, it must be admitted, that if the form of the shoe has experienced no very great or striking alteration of late years, the mode of applying it to the foot is much improved.

Without, therefore, entering into a detailed account of the various alterations of the horse-shoe, I shall notice the general principles of shoeing, leaving particular cases to the reflection and good sense of the groom and the shoeing smith.

I would lay it down as a general rule, in applying the shoe, to pare the foot as little as possible, from which, however, deviations must occur;—as for instance, where the foot is deep and the sole hollow, the crust is generally thick and strong, and will, of course, allow of more paring than a broad thin foot. But no absolute rule can be laid down, as to how far this paring is to be carried; each foot should be treated according to its degree of strength, weakness, brittleness, &c.

As in the action of the horse, the frog was intended by nature to touch the ground, if it be disabled by too much paring from doing this, if it thus be deprived of its natural action, the tendon becomes elongated, lameness perhaps produced, and not unfrequently windgalls.

The *bars* should not be scooped out, as is too commonly the practice among smiths; because, in conjunction with the frog, they are intended to keep open and defend the hinder part of the foot.

Diseases of the feet are frequently caused by improper shoeing, as many of the modern smiths treat all kinds of feet in the same manner, and will frequently remove more from a weak-footed horse than nature can re-supply for some months, when lameness can scarcely fail to follow. If a strong-footed horse, with a narrow and contracted heel, be placed in the hands of one of these men, under the pretence of giving the horse ease, the bar is scooped out, the frog pared, and the sole drawn as thin as possible:—a kind of treatment calculated to produce lameness, or confirm it if previously contracted.

Generally speaking, the shoe should stand wider at the points of the heel than the foot itself; or, as the foot grows, the heel of the shoe becomes imbedded in the foot of the horse, which will be likely to break the crust, produce lamenes, or a corn. The foot should be kept short at the toe;

as if left too long, it becomes thin and weak, and the heels low, whereby the flex or tendons of the leg are strained; whilst a short toe has a tendency to strengthen the foot, and also to keep the heels open and expansive.

In shoeing a thin footed horse, when the toe is cut short, it is advisable to leave it nearly square, merely rounding off the angles with the rasp. No nails should be driven into the hoof more forward than these angles, even in the strongest feet, nor yet so far as in general; and by this method, the nourishment that would procced to the support of the toe descends to the heels, and tends to keep them open. This, however, applies more to the hinder than the fore feet, because the horn is always thicker at the toe before than behind; while the quarters are even thicker of horn behind than before, by reason of the wearing of the toe being greater behind than before, The heel of the shoe, on strong and narrow-heeled horses, should be made straight at the extreme points; the form of the shoe thus assisting in the distension of the heels of the horse.

Horses which turn out their toes are apt to *cut;* and on examination this will be found to arise from the inside heel being lower than the outside heel, which may be remedied by paring down the outside heel if the foot will allow; however, as the heel will seldom allow this sufficiently, the shoe may be made thicker on the inside of the foot, from the heel to the toe, than it is on the outside, taking care that the inner heel of the shoes does not project too much.

Hitherto the observations on shoeing have been general. I now come to the exception:—*horses must be shod short for hunting.* If the hunter's fore shoes be not short, he will pull them off with his hind feet in jumping, and perhaps lame himself also. His hind shoes should be rounded or bevelled at the toe, to prevent any seriously ill effect which would otherwise arise from an overreach.

Instructions for the choice and purchase of a horse.

When a horse is exhibited for sale, or placed before a purchaser, the *color* of the animal first meets the eye of the inquisitor; and although I am well aware of the truth of the old adage, that *a good horse cannot be of a bad color*, yet I cannot help entertaining the opinion that the color frequently indicates the quality of the horse's constitution and temperament. I readily admit that there are good horses of all colors; and what I allude to, as indicative of the quality of the horse, is not the peculiar color, but the manner in which it is defined:—thus, whatever the color may be, whether grey, brown or chesnut, if it be strong and very distinctly marked, I think it indicates a good constitution. If, on the contrary, it be faint, or almost evanescent, (if such an expression may be allowed) I have generally found the constitution of the horse to correspond,—to be weak, feeble and liable to disease. And, if we reason upon this subject, the principle or hypothesis will be found perfectly consistent with the acknowledged laws of natural philosophy, and the rules of physiological science: since the weakness of the color arises from the corresponding weakness of the constitution of the animal, and may be consequently very justly regarded as an indication of the quality of the horse.

The principal colors of the horse are, the bay the black, the chesnut, the sorrel, the brown and the grey.

The *bays* are found of a variety of shades, the most beautiful of which, however, is the bright bay, mane and tail black, and black legs. Dark bays have generally their knees and pasterns black; and there are several sorts of bays that have black legs from the knees downwards. Bay I consider as one of the best colors.

Black I regard as one of the worst colors. It is is true, when you meet with a horse of a shining jet black, he looks beautiful; but in general, black horses are coarse in their coats, a strong indication of inferiority of blood. There are few black Arabian horses. We do not often observe a black race-horse; and those that occasionly make their appearance seldom distinguish themselves. I have had two black hunters, both Irish horses, and both excellent jumpers; but evidently deficient in blood, and, on that account, a capital run distressed them very much: it is a fact, that when you take a *pinch* too much out of an inferior bred horse, he does not come round again half as soon as a thorough bred. Nothing like blood—it will beat every thing else. Some black horses, have brown muzzles, and are brown on their flanks: these are called black browns: some are of a lighter color near their muzzles, and are called mealy-mouthed horses; and of this sort are the pigeon-eyed horses, which have a white circle round their eyelids. Those black horses that partake of the brown will be generally found the best.

The true *chesnut* is of one color, without any shade or gradation, while the hair of others will be found of three colors, the roots light, the middle dark, and the points of a pale brown. Many chesnut horses have their manes and tails nearly the color of their bodies. Chesnut horses are of various shades or degrees; some are very beautiful; but I have seldom seen a dark chesnut that pleased me. Some chesnuts have white faces; others have flaxen manes and tails, the latter are anything rather than pleasing in my sight.

The *sorrel* approaches the chesnut; and differs principally in this, that the colors of the hair are not so distinctly marked as in the chesnut. The hairs of the sorrel are of several colors, intermixed in which the red, or fox color, is predominant. Sorrels have generally much white about their legs, with a large blaze on the face, perhaps some bald all over the face.

Brown is a color by no means so beautiful as either the bay or the chesnut. It also has its degrees or shades, some horses being dark, and others light. Brown horses have generally black manes and tails, and also black joints; but they become gradually ligher towards their bellies and flanks, and many are light about their muzzles. A dark dappled brown is beautiful, but not often seen. I once possessed a light dappled brown horse, his color was faint; and he, like all horses whose coats are more strongly marked, which have fallen under my notice, possessed a delicate constitution, was a bad feeder, and incapable of enduring fatigue.

The *greys* are very much diversified in color; The dappled greys are very handsome, and so indeed are the silver greys. The iron greys are reckoned hardy. The light plain grey, and the pigeon-colored grey soon become white; as indeed

all greys do in process of time, the dappled grey and the iron grey keeping their color longer than any of the rest. The nutmeg greys are handsome, and the flea-bitten greys are not without their admirers. I have had at various periods several very good greys. The best hunter I ever rode, was a flea-bitten grey.

The *roans* are a mixture of various colors, wherein the white predominates; they have a general resemblance to each other, and yet are much diversified. Those that have a mixture of the bay or nutmeg color are the handsomest.

The *strawberry* resembles the roan; and, like the sorrel, is frequently accompanied with white on the face and legs.

The *fallow*, the *dun* and the *cream color*, have a common resemblance. There are many other colors of the horse produced out of the great diversity that are to be met with, which would require endless description, and after all would amount to nothing.

Black legs are preferred to white; and the latter being supposed more subject to disease. A correspondence will generally be found between the face and the legs in regard to white:—where there happens to be much white on the legs, white will be found to predominate on the face also.

The horse considered as to his form.

Although as far as regards the elegant quadruped under consideration, the term beauty might be abstractedly applied, yet a trifling investigation of the subject will clearly show that its general principles are not only applicable to, but striking exemplified in, the form of the horse.

If we compare the horse and the cow, we instantly perceive how much more beautiful the former appears, more graceful and more interesting to the eye; and the mind, in consequence, is impressed with more pleasing sensations. Whence, it may be asked, does this arise? From the superiority of the form of the one compared with that of the other. Very true; but such an answer is very unsatisfactory to an inquiring mind; and it requires a more tangible, a more specific, and a more conclusive reason before the subject is placed in a state of satisfactory and unqualified conviction.

Regarding beauty or form, therefore, on the broad and general principle, we shall find that any animated or inanimate form or thing presents a pleasing appearance precisely in proportion to its possession of what is understood among painters by the appellation of the *line of beauty*; it may be more plainly described as a serpentine line, which may be traced by the eye upon all beautiful animals, and which some of them present in great, if not endless variety. It will easily be perceived that the form of the horse exhibits the serpentine or gently bending line in considerable variety; while in the cow, it can scarcely be traced; and therefore the former is justly regarded as more beautiful in form than the other. If two horses are placed before the spectator, the one presenting an ewe neck, and the other with a well raised crest, can any person hesitate for one moment to pronounce which is the more beautiful? The ewe neck may be said to form the reverse of the line of beauty, and is therefore less pleasing to contemplate than the other, where the gently bending or serpentine line is obviously and boldly defined. The most beautiful horses exhibit the line in question very prominently, and in great variety; while in the more ordinary forms it is much less distinguishable, and in some can scarcely be traced. Hence, therefore, I should denominate this system of reasoning upon forms, *the philosophy of beauty*. The figure of the cow, as well as the figure of many other animals, instead of the true serpentine line, presents it ill-defined, as well as blunt or obtuse angles; appearances which may be regarded in a similar light to discords in music: they afford an opportunity of judging, of forming a decided and conclusive opinion; nor could we understand half so well, nor appreciate half so highly, the beauty of fine forms, but for the contrast.

Handsome horses will be found to differ in form, which merely amounts to this, that beauty is not confined, but presents itself in great variety.—Horses will be found with great decline or slope of the shoulder, powerful quarters, so far set in as scarcely to leave room for the saddle behind them: such horses will frequently appear long up the leg. Others will present a greater length of carcass and shorter legs. And, although horses exhibit one general appearance, yet if we are to descend to minute particulars, the ramifications of form would become infinite. It must be admitted, however, that there is a standard of form, which, though presenting trifling variations, is nevertheless superior to every other; and if I were asked to point out one of the finest figures of a horse (if not the very finest) that ever came before me, I should instance *Lottery*. This horse was bred by Mr. Watt, of Bishop Burton, Yorkshire, and was originally called *Tinker*. His running never could be depended on, owing to his vicious temper, and hence his name was changed to *Lottery*. His powers as a racer, I am of the opinion, were superior to those of any other horse that ever appeared upon the turf; but his running was always rendered doubtful, owing to his temper.

Speed may be regarded as expressive of ***strength***, since all animals remarkable for swiftness of progressive motion, are equally so for that tendonous or sinewy development which constitutes the basis of extraordinary force. Nor can it be otherwise; for, if we reason by comparison, great speed can alone be acquired from great strength. Of all animals there is none which exhibits so striking an exemplification of what has been just stated as the hare. This animal is remarkable for great declination of shoulder, for depth of chest, for breadth of loins, for widely-spread, strong quarters, and length of hind legs; a conformation which gives her greater speed than any other quadruped in creation! We must speak by comparison; and when the size of the hare is taken into consideration, she far outstrips all competition. It is true, there may be found greyhounds a trifle fleeter than the hare; but, then, they are three or four times larger, or more. And if we regard the greyhound, we shall find he possesses the low-dropping chest, and a form similar to the hare, but not in such great and even amazing perfection. The same observations are applicable to the antelope, the deer, indeed to all swift quadrupeds; and if we are anxious for speed in the horse, in selecting him let us not forget the form just described; which, it is evident, produces the greatest speed, and the greatest strength also; the hare

being the strongest, as well as the swiftest of all quadrupeds.

A horse intended for hunting should be strong and well bred, (if thorough-bred so much the better); his shoulders should be well sloped; his chest low; his arms long and powerful, short from the knee to the ground; his carcass or barrel round, deep-ribbed, strong loins, and widely-spread, powerful quarters; low-dropping strong thighs; if his sinews or tendons be large, strong, and well-defined, he can scarcely fail to have sufficient bone.

Such a form, it may justly be said, cannot fail for any purpose; hackneys or roadsters, however, are preferred which exhibit more of the cob figure, inasmuch as they are supposed to be capable of enduring more fatigue; but the notion is erroneous; the form for strength and speed being completely mechanical, it follows, as a matter of course, that the nicest and most complete adjustment of the parts cannot fail to produce the strongest, the fleetest, and the most perfect action; which consequently will continue to operate for the greatest length of time.

In the purchase of a horse, an inspection becomes necessary; and if the purchaser does not possess some knowledge of the busines, I would strongly advise him to have recource to the advice of a friend. Considerable practical experience is indispensably necessary before a good judgment can be given of a horse. Horse dealing, in the hands of many unprincipled vagabonds, in various parts of the country, is a regular organized system of swindling and robbery.

In preference to having the horse brought out of the stable, in the first instance, I would examine him in the stable. Let the groom stand at his head. Look at or into his eyes. If the pupil be considerably distended, and on coming to the light contracts and looks clear, so that you can see into it, or your own shadow reflected, the sight is good. There is a disease of the eyes called *gutta serena*, which causes blindness, yet the eyes look clear. In fact, when the horse is afflicted with *gutta serena*, his eyes assume one clear glassy appearance; the pupil being much dilated, without the power of contraction. This may deceive an indifferent judge, or an inexperienced person; but on a close and judicious inspection, this clearness will be found a vacant stare, in which the eye seems immoveable; and it is probable that in some of these cases the animal is not totally blind, though quite incapable of distinguishing objects. Cases of trifling cataract are not easily perceived unless by an old practitioner. Pass your hands down his fore legs, by which you will ascertain if there be any splents upon them, or puffiness, or windgalls about the lower part of them; and that the back tendon is strong and well defined, allowing you to feel your thumb and finger between it and the bone. Take up his foot to see that it is well formed, the heels open, and the wall thick, strong, and upright. Cast your eye down his back, by which you will be enabled to observe his loins; then let him be brought out. Stop him as he is about to leave the stable, just as his head is protruded, so that the light falls into the eyes; you will observe if the pupil contracts, as also if the eye is clear and transparent. When the horse is completely out of the stable, let the groom hold him quite still, that you may have a deliberate view or survey of his form; that you may see if his head be handsome, and well set on; that is, not boring out, but dropping handsomely from his neck. You will also observe the form of his neck and withers; that the former is well formed and comes handsomely from the body; the latter properly raised. His carcass round, his chest deep and broad, his arms powerful and long, leg short from the knee, knees not broken, fetlock not too much bent. Observe his quarters, wide-spreading, thighs muscular and low, fillets broad, his hocks free from capulet (capped hock, curbs or blemish, his hind legs free from spavins, windgalls or other diseases or blemishes; clear and free from gumminess. Then see him move or go. If his action be quick, distinct and good, mount him, ride him a mile or two, and if you become satisfied that the horse will answer your purpose, purchase him if the price happens to suit. Riding him a mile or two will enable you to ascertain if he be affected with piping, whistling, roaring, broken wind, &c.

I have yet said nothing respecting his age. I prefer purchasing a horse seven or eight years old to one younger, unless I know in what manner he has been treated from early life. If he has been snbjected to severe labor or harsh treatment, or both, he is thus rendered much more susceptible of disease, and although a horse may exhibit every appearance of soundness at four or five years old, if he has been used in the manner just mentioned —if he has been unreasonably and unnaturally strained by exertion at so early a period—the ill-effects of such treatment will be very likely to show themselves, in splents, in curbs, in spavins, founder, roaring, broken wind, &c. And on this account the greater part of the Irish horses are to be regarded with suspicion: few of them are without blemish. If, on the contrary, a horse has been well and kindly treated from early life, he may be purchased at the age of four or five without any extraordinary risk. When, however, a horse has reached eight years old, free from any serious disease or blemish, he is less liable to splents, curbs, spavins, roaring, &c.. than he was before he had attained maturity; he will also have acquired a knowledge of his business. The age of a horse may be ascertained by the appearance of his teeth until he reaches his sixth or seventh year, and those who practice it will be able to form a satisfactory opinion for some years afterwards. As the horse becomes older, his teeth increase in length; and various tricks are played to alter their appearance, to suit the sinister views of designing horse dealers, none of which, however, can deceive a well experienced eye.

When a horse beeomes very old, it may be ascertained that he is so by his skin becoming less elastic to the touch, however good his condition may be. Also if you feel the joints of his tail, a space between each will be plainly perceptible, if the horse be very old; whereas in a young horse the joints can scarcely be felt; and an opinion may thus be formed of the animal's age, according to the closeness or otherwise of these joints or separations.

The hollowness above the eye is no absolute criterion of the age of the horse, as it is found in many horses at an early period of life.

Horse dealers resort to various stratagems for the purpose of furthering their views. If a horse be lame on one foot they will lame the other, in order to prevent the lameness being observed; and

by the administration of fat bacon, they can prevent the noise emitted by the roarer for some hours. Figging is a disgusting practice, and whenever you observe a horse dealer make use of it and keep the animal prancing or in motion by the application of the whip, you may reasonbly suspect deception. Horse dealers of character never resort to such practices; but amongst all the lower grades of this suspicious profession, nothing is more common.

Amongst other tricks resorted to by swindling horse dealers is that of *bishoping*, an operation performed on the mouths of horses, with a view of making them appear young, when the natural marks have become obliterated.

The front teeth in young horses meet exactly in a line perpendicularly to each other. As the horse grows older these teeth assume a more horizontal direction, the upper teeth projecting very considerably over the lower; at the same time the upper corner tooth forms a curve over the lower corner tooth. He therefore forms an artificial cavity in the head of the corner teeth with an engraving tool, and by burning it with a hot iron gives it a black appearance, quite sufficient to deceive an inexperienced person, but which is easily detected by those who understand the business; for, although the dealer may make these marks in the corner teeth, he cannot alter their horizontal direction, nor restore them to that perpendicular approximation so remarkable at an early period of life. Neither can he re-produce the ridges of the roof of the mouth, nor furnish the teeth with their original concavity. But as it suits the dealer at times to make an old horse appear young, so, at others, he is auxious to make a young horse appear somewhat older. It is very well known that a horse is more saleable at five years old than at four, and therefore the dealer attempts to produce the mark of an additional year, by drawing the corner teeth before the natural period of their dropping out. The bars of the mouth are also cut, to let the tushes protrude prematurely. But all this is insufficient to deceive the eye of experience, though the cheat may succeed with others; for, although the corner teeth are removed, and the appearance of the tushes accelerated, yet the animal has not attained his fifth year till the corner teeth, both of the upper and lower jaw, are complete, and the marks of the middle teeth begin to fill up. The tushes also should rise considerably above the jaw.

It is difficult to ascertain the precise age of crib-biters, and horses whose teeth are extremely hard; the former lose the marks of their teeth before the usual period, the latter retain them long after seven years. In examining a horse's mouth, it is advisable to observe both sides of it, as a considerable difference frequently occurs from the mastication of the food being performed on one side of the mouth only; in which case, the teeth on that side of will have made the greater progress in alteration.

As a horse becomes old, grey hairs appear on the forehead, and the lower parts of the mouth; the lips present a lean and shrivelled appearance, the lower lip hanging considerably below the upper lip. The ears also drop laterally.

Bridles, Saddles, &c.

The principal part of the bridle which demands notice in this place is the bit, which varies in form, but which only forms two complete divisons, which are generally designated the snaffle and the curb. Bits have at various times undergone alteration, and hence have received the appellation of the Pelham bit, the Pembroke bit, the Weymouth bit, the hard and sharp, the Portsmouth, the Chifney, the Cannon, &c.

Strictly speaking there are but two kinds of bits: yet, such is their construction, that mildness or severity may be produced in their operation. The mildest is the colt's bit, which is made large and smooth in that part which compresses the lip against the bars; the larger the mouthpiece of the bit the milder its operation; and the colt's bit is rendered still milder by the centre of the mouthpiece being united with a ring, by which the pressure becomes less severe. There is usually to a colt's bit a flat triangular piece of iron fixed to the ring, and three or four drops suspended from it, for the purpose of stimulating the tongue to move, by which means the mouth is keep cool and refreshed; if the mouth is suffered to become dry and hot, numbness and insensibility ensue. The cheeks to this bit, and indeed to all snaffles, should be six inches long; and the eye (to which the head-stall and reins are affixed) sufficiently large to admit of strong reins working freely.

The common plain snaffle, the mouth piece of which is generally about the thickness of one's finger, is so well known as scarcely to require a description. Some variation in the power of this bit may be produced by the length and thinness of the mouth piece, which renders it sharper; when thick and short, it is mild. A twisted snaffle is more severe than a smooth snaffle; and the deeper and thinner the twist, the sharper the operation becomes.

The bridoon is a snaffle without the cheek piece and is only used with another bit, where cheek pieces would be an incumbrance. The bit should be placed in the horse's mouth, so as not to wrinkle the corners, or otherwise cause pain to the animal: it cannot be placed too low as long as the horse cannot get it over his tushes.

What, strictly speaking, is called the bit, may be thus divided; the mouth piece, curb, crub-hook, chain-check, and branches. The mouth piece is the part which is placed in the mouth of the horse, the length of which is usually about five inches, and round, the ends of which should rest on the bars of the mouth, and the middle form a cavity in which the tongue may lie easy. The cheeks are the parts above the mouth piece on each side the jaw; the the branches are the lower parts, upon which the power of the bit mainly depends, its power increasing according to the length of them. The curb chain is constructed so as to lie smooth and flat under the jaw.

The bridge of the mouth-piece, I would not recommend to be high, as, if so, the horse must be rendered uncomfortable. The Portsmouth bits were invented for the purpose of forcing the horse's jaws open, by which it was supposed a run-away horse was more easily held.

The bit and bridoon are generally used together, and form what may be called the double bridle.

The *Saddle.*—This instrument may be considered equally as convenient to the horse as it is to his rider; it enables the former to carry his burden with ease and comfort to himself, while it ren-

der the seat of the latter secure, easy, and pleasant

The fitting of the saddle contributes greatly to the ease of both the horse and his rider; and for a saddle to fit well, the bearing should be equal where it is intended it should; and the closer it comes down, so that neither the weight of the rider nor the settling of the pannel, can bring it to injure the withers or chine, the better.

Cruppers have, generally speaking, been laid aside, and very properly so, except in breaking, where they are necessary: breast-plates are rendered necessary in hunting, as well as on the course. Deep chested horses, in high condition, require breast-plates, particularly in climbing hills.

The *Stirrup.*—I shall merely remark in this place, that the spring or drop-stirrup renders it impossible for the foot to be entangled in it in case of a fall, is equally pleasant for general use, and therefore preferable.

The *Martingale* is used for the purpose of preventing the horse from carrying his head too high. The head of the horse may be pulled down by means of the martingale; but, take it off, and the horse throws his head up immediately. To be of any use in this respect, the horse must be constantly ridden in it; and should he trip or stumble if the rider attempts to assist him, as in ordinary cases, he can scarcely fail to throw him down, since he thus deprives the animal of the power of recovering himself. In hunting, I consider the use of the martingale as pregnant with danger. If a horse he deprived of the free and natural use of the head, he cannot go through heavy ground without extraordinary distress, nor can he take his jumps with ease and freedom.

A lady's saddle should be fitted to the horse with the greatest exactness possible, as the manner in which a female sits on horseback cannot fail to give the saddle an inclination to the near side, and the horse must consequently suffer if there be not a correspondence in the saddle. The pommel should come down as close to the withers as possible, so as not to touch when pressed by the weight of the rider; and ladies' saddles, when properly made and properly fitted to the horse, will not require cruppers; but the girths should be crossed from the hind part of the saddle to the front, by which the saddle will be kept more steady: or a strap from the hind part of the saddle to the fore girth on the off side, may prevent the saddle from twisting to the near side.

General observations on horses.

I have repeatedly observed, that the horse is the most elegant quadruped in nature; with equal truth, it may be further remarked, that he is the most useful also: and although infinitely inferior to the dog in point of sagacity, yet like that animal, he possesses the extraordinary faculty of finding his home through a thousand intricate turnings and windings. Ride a horse a hundred miles from home, on a road which he has never seen before, and he will not fail to find his road home, without a single mistake, if allowed to obey the dictates of his own sagacity. Some years ago, I rode from Bowes in Yorkshire to the village of Weardale, in Durham, the distance about thirty miles, and a considerable part of the way across moorlands where the road or path was very ill-defined, to say nothing of the endless turnings and twistings of the by-lanes along which we passed, and which rendered almost continual inquiry indispensably necesssary, the road being perfectly unknown to me as well as to the animal which carried me. I was accompanied by a friend, like myself, entirely unacquainted with the road, and both of us mounted on ponies.

Utterly strangers to the road, we had to inquire of almost every person we met, and consequently proceeded slowly: but we thus never mistook our course.

After remaining for several days at Weardale, we set out on our return for Bowes; and trusting to the guidance of our ponies, continued our route without the least interruption, till we had accomplished about half the distance, when we came to a crossing where several roads were presented, one of which was unhesitatingly taken by our ponies, which we conceived must be wrong; and we therefore turned them about, and took another direction. The ponies testified reluctance, and it so happened that we had not gone three-quarters of a mile before we had an opportunity of making the requisite inquiry—when to our regret we found that we must retrace our steps, and take the very road along which the ponies would have proceeded!

Whence the horse derives the faculty of finding his way home through all intricacies, is not known, though it is evident it must result from a sort of memory—a species of recognition which phrenologists would perhaps denominate "*individuality;*" and which in fact is common to quadrupeds; but unknown to, or not possessed by, human nature—at least in a state of civilization; although something of the kind seems to be demonstrated by savages, and particularly by the Indians of North America.

It will be generally found that horses with large wide foreheads are good tempered; on the contrary, where the forehead happens to be narrrow and small, the animal will manifest a vicious disposition.

Some horses are alarmed at passing over wooden bridges, pasticularly those which swing across canals; on which occasions they should be soothed and coaxed; and if they still refuse to go over, the rider should dismount and lead the animal, as the horse will probably follow him; if there be another horse in company that will pass over, the alarmed horse will seldom fail to follow. On occasions like these, the whip and spur should not be used: coaxing will allay the fears of the horse, and by a little practice his alarm will subside altogether.

In cases of fire, horses become so alarmed that it is difficult to get them out of the stable; and it has sometimes happened that horses have been burnt to death under such circumstances. The best plan on such occasions, is to place a bandage over their eyes and back them out, if they will not lead. If the horse happens to be in a loose box, or in such a situation as will allow of his being turned about, if, after the bandage be placed over his eyes, he be turned several times round, he will be easily led away. Where there is not time or opportunity for bandaging the horse's eyes, let two men place each a hand over his eyes, and back him out.

A horse would seem to possess a sort of super-

stitious fear, which is strikingly exemplified in passing along narrow gloomy lanes amidst the darkness of night; on which occassions, they will start at shadows, snort, and testify symptoms of a supernatural dread, in a manner too evident to be mistaken.

Some horses are inclined to lie down, when ridden into water, for the prevention of which the following methods are recommended by some of those sapient gentlemen who have written on the subject, and amongst the rest, by Berringer, who very seriously tells us, that the rider should be provided with a flask of water, and at the moment the horse is about to lie down, the flask should be broken on his head, that the water may run into his eyes! Or the rider may provide himself with two bullets, with a hole drilled through each to suspend them by a piece of twine, when the horse attempts to lie down, to drop the bullets into his ears!!! It is really astonishing how such outrageous nonsense could enter the head of any human being; but, indeed, after what has appeared from the pen of that inexhaustible scribbler, Mr. John Lawrence, upon the subject of horsemanship and horses, we ought to be surprised at no absurdity whatever. To remedy for the propensity in question, what can be so effectual and so obvious as the whip or the spur or both?—Moreover, if I suspected a horse would play such a trick, I would hold his head well up, and apply the spur if necessary.

In riding down a hill, let it be recollected that the horse should assume a corresponding declivity, and for that purpose he should be allowed the use of his head to the necessary extent, or he cannot accomplish the object. I am aware that, in such a position, the horse's head will appear at a great distance, a circumstance which might alarm a timid rider, from an idea that the horse was about to fall: he therefore pulls up the horse's head as high as he can, and, in consequence, the horse is rendered incapable of placing his fore feet firmly on the ground, and is therefore very liable to fall. The horse should have his head freely in going down hill (as well as upon level ground) by which he will take a corresponding declivity, the rider's body being perpendicular; and, if any suspicion be entertained of the safety of the horse's going, a watchful or ready hand may be kept upon him.

A friend, a few weeks ago, asked me what was meant by the word *condition*, as applied to the horse? And my reply was, that the condition must be understood according to circumstances, since a horse may be sufficiently in condition for slow work, but yet not able to maintain *the pace*. Leaving the condition of the racer out of the question (many of which are overtrained,) a hunter, to be in perfect condition, should have as much muscle as possible placed on his bones by good keep, which muscle should be quite divested of fat, and rendered elastic, firm, and hard, by exercise and friction; or, in other words, by good grooming. This being the state of the muscle, the tendon cannot be wrong: on the muscle and tendon mainly depend the speed and strength of the horse.

It can scarcely have escaped the notice of those familiar with the subject, that the thorough-bred horse, after having experienced several removes from the original Arabian, loses that light, elastic, deer-like action for which the latter is so remarkable, and which indeed renders his mode of going so extremely beautiful. It will be very perceptible in the immediate descendants of the Arabian; but, in a few removes, it becomes extinct, and in its place is substituted a tremendous length of stride, which raises the English thorough-bred horse far superior to every competitor. If with this length of stride, the true Arabian action could be preserved, the English courser might be regarded as the very perfection of the horse. The Arabian horses which have hitherto made their appearance in this country have been small, and therefore in order to reach the stride of the English racer, several removes have generally been found necessary before the requisite sizes and length could be obtained, and in this process, as I have already observed, the true Arabian action has been lost.

Let us hear what Bruce, the celebrated Abyssinian traveller, says upon the subject:—

"At Halfaia (says he) begins that noble race of horses justly celebrated all over the world. They are the breed that was introduced here at the Saracen conquest, and have been preserved unmixed to this day. They seem to be a distinct animal from the Arabian horse, such as I have seen in the plains of Arabia Deserta, south of Palmryra and Damascus, where I take the most excellent of the Arabian breed to be, in the tribes of Mowalli and Armecy, which is about latitude 36°; whilst Dongola, and the dry country near it, seem to be the centre of excellency for this nobler animal.

"What figure the Nubian breed of horses would make in point of fleetness, is very doubtful, their make being so entirely different from that of the Arabian; but if beautiful and symmetrical parts, great size and strength, the most agile, nervous, and elastic movements, great endurance of fatigue, docility of temper, and seeming attachment to man beyond any other domestic animal, can promise anything for a stallion, the Nubian is, above all comparison, the most eligible in the world. Few men have seen more horses, or more of the different places where they are excellent, than I have, and no one ever more delighted in them, as far as the manly exercise went. What these may produce for the turf is what I cannot so much as guess; as there is not, I believe in the world, one more indifferent to, or ignorant of that amusement than I am. The experiment would be worth trying in any point of view; the expense would not be great.

"All noble horses in Nubia are said to be descended from one of the five upon which Mahomet and his four immediate successors fled from Mecca to Medina on the night of the Hegira. The horses of Halfaia and Gherri are rather smaller than those of Dongola, few of which are less than sixteen hands."

All the Arabians which have fallen under my observation have been little horses, and that this is generally the case with those imported into this country is beyond all question; and in consequence, whenever the pure original blood has been re-introduced, it has required several removes before that length of stride could be produced for which our racers are so very remarkable. Hence we clearly perceive the reason why the immediate produce of the little Arab and an English mare cannot compete with his long-striding rival; and on this

account therefore the Arab has sunk in the estimation of breeders.

However, I have uniformly noticed in the immediate descendant of the real Arab, that light, bounding, deer-like action, which is conspicuous, and indeed a leading characteristic in the original breed; and which evidently decreases the farther we go from the true source, till at length the mode of going becomes clumsy and *lumbering*. Even with some of the horses which appear as racers, this may be noticed: but such horses are seldom successful on the turf; nor can they be, since they substitute strength and stretch for that elastic motion so essential to true running.

Since, then, the Arab, or mountain horse, is objectionable to the breeder of this country merely from his diminutive figure, the Nubian, or horse of Dongola, would from an admirable substitute; if we are to place confidence in the accounts of those who profess to have been eye witnesses, with every advantage of size, he possesses all those essential requisites (in a superior degree) which characterize what is called the thoroughbred horse.

It is to the spirit of the emulation on the turf that we are indebted for our prime hunters and hacks; if therefore, the horse of Nubia be introduced, and our breed of racers thus improved, we may fully expect that our hunters and hacks will experience improvement precisely in the same ratio.

The inhabitants of these islands are evidently superior to those of every other country in the treatment of the horse; but the breeding department is perhaps susceptible of improvement.—The introduction of the horse above noticed might effect this to a certain extent; and the judicious selection of individuals would essentially assist in furtherance of the same object. In the choice of either stallion or mare, form should be the criterion, since it is of no consequence what blood either may possess, if the requisite form be wanting. From *form* alone, as I have already observed, results both strength and speed.

In the rearing of foals and young horses, attention is necessary, particularly in regard to the ground or pasture. Hilly, dry countries are favorable to young horses: flat and marshy ground, the contrary. Horses reared upon soft, moist and flat grounds have large (generally flat and thin) feet, since moisture promotes the growth of the horny hoof; further, reared upon ground of this description, their shoulders become upright from the mode in which they are compelled to feed—bringing the head as low as possible, and thus the shoulder necessarily comes forward. A straight shouldered horse must be unsafe to ride, and cannot be fleet. Horses reared in dry hilly countries have upright hoofs, handsome and good feet, and in consequence of feeding principally by the sides of the hills, their shoulders will assume the declining position—so essential to superior action, to safe going, to speed, and indeed to every thing valuable in the horse.

For the Farmers' Register.

DIKING IN CHARLOTTE COUNTY.

On account of the little attention that has been paid to arrest the washing of high lands, the flats have, on many streams in this county, doubled their original depth of soil, and have become the most valuable land on a plantation. To secure the flat land from the effects of inundation, should, therefore, be a great *desideratum* with every cultivator of such lands. But as important as this subject is, it has received but little attention in this county. Diking and straight ditching have in many instances been attempted; but their entire failure to answer the end designed, proves that but little exertion has been made by the undertakers to get proper information on the subject. I do not mean by this remark to assert that there is no efficient diking in the county; there are a few exceptions of well planned and well executed dikes, that answer a most valuable purpose.

The two great errors in execution of nine-tenths of the dikes that have fallen under my observation are—1st, that they are not made wide enough at the base—and 2d, they are not made of sufficient height. It is a remarkable fact, that many intelligent planters will build a dike for the purpose of protecting a flat from freshets, and stop at a height lower than the known limits of high water. In consequence of which, the first freshet that comes sweeps over their work, and destroys at one "*swoop*" the labor of months. But a still more remarkable fact is, that when the dike *is* destroyed, it should be again rebuilt a *little* higher than before, but not sufficiently high to save it from a *swell* of the same height, as at first destroyed it. There are, however, a few dikes in the county, that have hitherto defied the highest freshets on the streams upon which they are located. I intend, for the present, however, to notice only *one*, that has been recently completed by Mr. James W. Bouldin. Mr. Bouldin's flat land lies at the junction of Wardsfork with Little Roanoke river. Its dimensions are about one hundred and twenty acres. Wardsfork and Roanoke meet nearly at right angles, and Mr. B.'s flat lies partly on both of these streams. There is an old dike, of several years' standing, on the bank of Wardsfork, thrown up originally only with a view of keeping within proper bounds the waters of Wardsfork; the flat land of which stream lies lower than the flat of Little Roanoke. Mr. B. has, recently, thrown up another dike, commencing near the lower extremity of the old dike (and connected with it by a natural dike or ridge,) and extending along the banks of Roanoke, until it strikes the line or boundary of his flat. It then follows his *line* until it reaches a head land, where the dike terminates. The new part of this dike is thrown up two or three feet higher than the highest water mark that has been made on Little Roanoke for many years, and may be regarded as a complete protection of the flat from the effects of freshets. The dike is twenty-four feet wide at the base where it commences. Its height through the whole extent, is made on the same level; but inasmuch as the surface of the ground, which is the foundation of the dike, rises as it approaches the head land, the actual height of the dike is not more than half as great where it terminates, as at the beginning. The dike has four feet of base for every foot of elevation. The cost of the part recently executed, was estimated at five or six hundred dollars; or an average of 80 cents to the yard. If the old dike was raised to such a height as to render the Wardsfork flat equally secure with the Roanoke low land (protected by the new dikes) the whole of the 120

acres might be regarded as entirely safe; and I do not suppose the proprietor would give one per cent. on their value, to have them ensured from the effects of high water, as long as the dikes preserve the elevation contemplated. Mr. B. intends in a short time to raise the dike on Wardsfork to the necessary height. The cost of both dikes, when completed, may be estimated at twelve hundred dollars; the value of the land (the 120 acres) at eight thousand dollars.

Mr. B.'s dike leaves the Roanoke low ground near the mouth of a large straight ditch that was cut by the late Hon. T. T. Bouldin, and which carries the water of Little Roanoke. This ditch is one of the greatest works of the kind that has been undertaken in this county. Its operation and extent may well furnish a subject for a separate article.

E.

RESULTS OF EMIGRATION TO THE WEST.

To the Editor of the Farmers' Register.

Kemper County, Mississippi,
April 14, 1837.

* * * * Though literally buried in the woods of the south-west, where I assure you little else than cotton is ever thought of, and where reading of *any kind harasses* but little, very few, particularly that pertain to agriculture, yet, I must confess that your interesting journal affords me as much pleasure now as before I emigrated to this country. Not the least gratifying is the fact that the system of agriculture in old Virginia is vastly ameliorating, and with it, necessarily follows an improved condition in the lands. You are doing much to arrest the tide of emigration, which sweeps many a thoughtless fellow on to ruin. Emigration, to use a *hard* phrase, is not the thing it is *cracked up to be*, in many, perhaps in a majority of instances. It is true more money may be made here; but you may rest assured it requires hard knocking: and I am not prepared to say that the advantages of emigration so far outweigh the disadvantages of remaining, as to justify (other considerations being equal,) a separation from relations and friends, and scenes hallowed by the recollection of early associations. You no doubt are apprised of the confusion and distress in the pecuniary affairs of this country; perhaps they are greater than you can well imagine. Many, or several causes have conspired, in my opinion, to precipitate the country in its distressed situation, viz: over-trading in every respect—real estate speculations in Mobile—(I am credibly informed, that while speculation was at its acme in that town, lots sold higher than they ever sold in New York;) and last, though not least, the operations on the part of government in deranging the whole currency of the country. We are, however, looking forward to better times. Negroes have fallen very considerably: indeed, I have no doubt but it was the system of selling them on a credit that enhanced their value so enormously; for I assure you the profits of the planter, cotton at 15 to 17 cts., cannot justify him in giving fifteen to eighteen hundred dollars for negroes. You doubtless, have heard many exaggerated reports of the profits of the planter in this country. In some instances almost incredible profits are realized, but they are those, in the realization of which the common feelings of humanity, and the respect of the world, are notoriously disregarded. A hand, I would say, can make from two to three hundred dollars cotton worth 15 to 16 and 17 cents, if the necessary economy and skill are used, besides a sufficiency for self-support; and that is as much as can reasonably be expected. Indeed I do not believe that amount is made by an average number of planters. On some leisure occasion, I will give you an account of the mode of farming—cotton planting—most generally in use by the most successful planters in this section of the country.

B. H.

ROTATORY STEAM ENGINE.

A planter of South Carolina has requested of us information respecting the *Rotatory Steam Engines* used in New York—especially as to their cost, safety, durability, and power, and whether they are suitable for such plantation business as grinding corn, thrashing and pounding rice, and sawing timber. As we know nothing on this head more than what has already been published in preceding numbers of the Farmers' Register, we will be obliged to any person who will furnish the information desired by our correspondent. A steam engine much cheaper than those generally known would be useful on almost every southern plantation. Indeed, for sawing timber, where fuel, of course, would cost nothing, we see no reason why steam power, as heretofore put in action, would not be economically used, wherever water power would be desirable for the same purpose. The noble pine forests on the level lands of North and South Carolina, will, at some future time, bring into operation hundreds of steam saw mills.

REMARKS ON THE SOIL AND CULTIVATION OF A PART OF THE COUNTY OF HALIFAX.

To the Editor of the Farmers' Register.

The plantations lying on and near the public roads leading from Halifax Court-house to Milton, (N. C.) and Danville, like most of the lands of middle Virginia, are cleared of the greater part of the forest growth; and have been long subjected to the exhausting rotation of tobacco, for the first three or four years after the wood is removed: then, to the uniform rotation of one year in corn, the next in oats, the third in pasture, then corn again, &c. But, although this exhausting system has been pursued, yet, the original fertility of the soil of this portion of Virginia was such, that it is still productive; and where an improving system has been pursued, it is rich. The high lands on the small streams, through this extent, (which are tributaries to the river Dan,) are the best that the writer of these lines has ever seen in middle Virginia. Their color is generally a dark grey (approaching a black loam,) and red—substratum, red clay, under the red colored soils, and frequently, a greyish substratum, specked with mica, under the grey lands. Some of the grey soils, however, have a firm, dry, red clay, substra-

tum; and these are generally of superior quality. The most prominent trait in the character of these soils, is their peculiar suitableness for the growth of clover. I was informed by several of the planters of this part of Halifax, that the growth of clover is always luxuriant, even on their thin highlands. It is evident that the more sandy grey lands of some of the adjoining counties, and indeed of other parts of this county, (Halifax,) that would produce as good corn, would not produce half such a crop of clover. The effects of gypsum are much greater here than on any lands I have seen. A very practical planter, Mr. R—— informed me, that although the effects of gypsum are astonishingly great on cleared and littered lands, yet, he found no benefit from it on a clean soil, (a soil destitute of coarse vegetable matter). It has been principally applied around the stalks of tobacco and corn, by the few who have used it, at the rate of a little less than a table spoonful, around each stalk. As yet, no broad-cast dressings of gypsum on clover have been tried, to any extent, by those who conversed with me on the subject.

There are many evidences that this soil contains a considerable portion of calcareous earth: not only from the beneficial effects of gypsum but from the growth of the uncleared land. I took up a few pieces of clay marl, thrown out on the bank of a mill race of Mr. E———'s, that effervesced rapidly in weak vinegar. A dark colored mud taken from a ditch bank, also, effervesced freely, when thrown into vinegar. The growth of the uncleared lands is pawpaw, red-bud, walnut, pine, &c. The thistle is a common growth, on the cleared lands. The tobacco from this section of the state has generally commanded high prices for manufacturing: and it seems highly probable, that the marl ingredient gives it its rich, yellow color, and delicate texture. I will hazard the opinion, that if the planters of this part of Halifax would curtail their tobacco crops, and cultivate wheat on a clover lay, made luxuriant by the application of gypsum, that it would be found a profitable crop. The wheat grown here is of unusually fine quality. I have heard it remarked, that the wheat that grows in the counties of Granville, N. C. and Mecklenburg, Va., as well as in this county, (Halifax,) is of fine quality—and makes whiter bread than that grown on James River, and in more northern climates. If this be true, and is the effect of a southern climate, wheat cultivators, in this latitude, may be partially compensated for the diminished quantity, in the better quality of the article. It would be an interesting experiment for some of the planters in this fine wheat section, to try the cultivation of the spring wheat. Mr. Richard S. Gaines, of Charlotte, has a lot of spring wheat, that looks, at this time, decidedly better than any winter wheat of several varieties which he is cultivating. The early commencement of the spring, in this latitude, would seem to furnish a *prima facie* argument that the spring wheat would flourish better here than in New York, where it has been successfully cultivated. There is a species of wheat cultivated here, hardier, whiter, and more productive than the Lawler, but very difficult to thrash. In passing the farm of Mr. James Bruce, Jr., I observed a lot of wheat, very decidedly better than any I have seen this season, which was sown at least a month earlier than the usual time for seeding wheat. Such a marked diversity, will doubtless, induce Mr. Bruce to repeat this experiment. This lot was sown, I am informed, on a naked fallow. Mr. Bruce has abandoned the cultivation of tobacco, on the farm upon which he resides; and, already, strong marks of a system of improvement are exhibited. Mr. Bruce was absent when I passed his farm; but a large portion of it lies in full view of the road. His land is generally in clover, that is immediately under cultivation; well protected from washing, by hill-side trenches, and very well enclosed. Mr. Bruce has introduced the straight fence, or at least, a species of fence much straighter than the ordinary *worm fence, staked and top-logged.* This fence, although much in use in the lower part of Virginia, is scarcely ever seen in this part of the state. It can be made with but little more than two-thirds of the quantity of timber required to run the crooked staked fence; and there is but little difference in the amount of labor bestowed upon each. Mr. Bruce on one occasion, gave me an account of his mode of making it—which I adopted, successfully, with but little variation. The worm of the fence is first laid, of the desired straightness. The rails, I think, should cross each other at an inclination of two feet from a strait line. This part of the operation is regulated by two rows of stakes, equi-distant from each other, which are two feet apart. As soon as the worm is laid, two hands follow—the one with a large maul, and the other with a large stake about two or three feet long, sharpened at one extremity; with a cross piece, two feet long, of an inch and a half diameter, let through, near the other extremity. This stake is driven down with the maul, where the rails lap, on either side, and drawn out by the cross piece or handle, which operates as a lever. The stakes are then put in, and *very slightly* rammed, if the holes are made sufficiently deep by the short moveable stake. The tops of the stakes are sharpened, before they are put up, to the size of a large augur hole—then when put up, they are coupled at top, by a slip of timber, eighteen inches long, with holes bored in it, to fit the ends of the stakes. The rails are then put up, and the fence completed. The rails should be nearly of the same length. The stakes should be of heart oak or pine; and the pieces that couple the stakes are rived from eighteen inch blocks.

The profits from the tobacco crop have been very considerable for the last thirty or forty years, in this section of the county of Halifax; but the little wood land that remains, and the exhausted condition of the soil, begin to furnish a striking admonition of the propriety of looking out for a partial substitute for its cultivation. The Dan River is open to bateau navigation, through this part of its course, and the expense of the carriage of wheat to market, considerably diminished.

Mr. James Bruce, Sen., has a plaster mill that supplies the demand for this article in this neighborhood, at as cheap rates as it is furnished ground in Norfolk or Petersburg. Mr. H. Edmunds is also erecting a plaster mill, near Dan River, in a district of country admirably suited to the application of gypsum. The unground article will be brought up the river, (Dan,) from Petersburg or Norfolk.

Mr. Edmunds has been, for many years, a suc-

cessful cultivator of corn and tobacco: and a short account of his management, may not be uninteresting. The plantation on which he resides, is situated on Birch Creek, a tributary of the Dan; and constitutes a portion of the lands above designated, as containing marl. The plantation is divided into four fields for corn, and four for tobacco. His rotation on his corn shifts, is, 1st corn—2nd oats—3rd clover—4th clover. His rotation on his tobacco fields, is 1st tobacco—2nd wheat—3d clover—4th clover. Although he has pursued this system for many years on his corn shifts, yet he has improved his corn land very little: owing to excessive hard grazing of his clover in the third and fourth years of his rotation. He has never grazed his tobacco lots, and they have improved perceptibly. In fact, some of his tobacco lots seem to produce larger crops than they did when they were first cleared; and he has put no manure on them worth estimating. He admits that it is very injurious to graze off his clover from his corn land, and is preparing to dispense with this part of his management, by providing a standing pasture for his stock.

Mr. Edmunds generally beds his corn land in the fall, upon two coulter furrows. The dagon and coulter are drawn by two strong horses. He is a great advocate for deep ploughing. He rolls his seed corn in plaster, and plasters his corn when the stalks reach two or three inches in height. A large portion of the labor of his farm has, for many years, been directed to reclaiming and clearing a large body of flat land, on Birch creek, which is now exceedingly productive. He found the course of this creek very circuitous, as it meandered through his plantation—the banks very low, and the flat land covered over with a number of ponds. His first effort at draining was, to cut a canal for the bed of the creek. This he cut twenty feet wide, with an average depth of two feet eleven inches. Its length is two miles. The ordinary cost of such a work, he estimates at fifty cents a yard; although particular circumstances enabled him to have this work executed for a less sum. This ditch was cut as straight as the nature of the flat would allow, in order to promote abrasion at the sides and bottom of it. Mr. E—— considers it very important in straightening streams to have as few angles as possible; to avoid all *sudden* turns; and to throw those turns that cannot be avoided, (if possible,) against hill sides, that jut against the stream. The object of this last precaution, is to prevent excessive washing, which would be caused in a freshet, by the whole current of the stream being thrown against a weak bank of the ditch. Soon after the completion of this ditch, Mr. E—— perceived that it had commenced washing at the lower extremity; which, gradually went up, about a foot at a time, until it has reached, now, a depth of seven feet from the surface of the earth to the surface of the water. He found the washing at bottom greatly facilitated by removing obstructions of trees, that fell in the ditch by being undermined as it widened, and logs, that are constantly coming to view, at a distance of three, four, five, and seven feet from the surface of the earth. I observed ten or fifteen of the latter, within a distance of one hundred yards, that have been buried, perhaps, for centuries, and protected from decay by their seclusion from the atmosphere. Mr. E—— occasionally used the spade, in removing small beds of blue pipe clay, which he found too tenacious to wash. He thinks that if such obstacles had been timely removed, as they occurred, that the stream would have washed to its present depth in one year. The beneficial effects of this ditch have exceeded his highest expectations. The sites of many ponds, that formerly abounded in fish, are now cultivated in tobacco and grass; the stream is sunk to such a depth, that sufficient fall for all the draining ditches has been obtained; and the soil of the flat is soft and dry. Formerly, no crop was safe from freshets, on this flat; now, a crop is very rarely injured by them. Mr. E—— thinks that a *corn crop* is entirely safe, from the effects of freshets, on this land. He anticipates extending this ditch lower down the stream; and expects to gain by it a foot or two, additional, of depth; which, when obtained, will put his flat entirely out of the reach of high water, from freshets.

Mr. E—— thinks that the draining of this land has produced a great effect on the health of his family. Nearly the whole of this flat was formerly covered by a mill pond, which was so nearly situated to Mr. Edmunds' residence, that bilious and intermittent fevers, for many years, with much fatality, visited his family. But since the pond has been drained, the stream straitened, and the flat also entirely drained, his residence is as healthy as any other in the county.

Mr. E—— has recently erected a mill (supplied with water by a canal) near the site of the old mill. The new mill is better than the old one; one hundred acres of fine flat land has been reclaimed, and the health of the neighborhood much improved, A good expedient, to prevent the bad effects of the check-dam, that throws the stream in this canal, is adopted by Mr. E——. To prevent the water from being thrown out above the check-dam, in freshets, he has thrown up a dike, about eight feet high which commences at one extremity of the dam, and terminates at the foot of a hill, that runs up to the channel of the creek. If dikes of sufficient height, were thrown up in all similar situations, and a small ditch cut on the land-side of the dike, and parallel with it, as a draining ditch, the flat land lying above the check-dams might be made as valuable as any other flat land.

The drainage of creek and river flats, and drawing off pond water, have produced the most decided beneficial effects on the health of the county of Halifax. Bounded on the north-east by Staunton river, and intersected by the rivers Banister, Dan, Hycootee, and their numerous tributaries, the county of Halifax was, perhaps, as much infested by *malaria*, as any county in middle Virginia. The quantity of flat land, covered with stagnant water, bore an unusually large proportion to the dry land; in consequence of which, Halifax county, was, for many years, visited with autumnal fevers to a great extent. A very intelligent physician, who has been long acquainted with the topography and diseases of the county, informed me that the fall fevers have diminished in the ratio of the quantity of land left undrained, and uncovered by stagnant water. It was formerly the case, that a man's residence might be almost accurately guessed at, by looking over a physician's accounts; so much more numerous were the visits made to settlers on the rivers and creeks, than to the settlers on the ridges. Dr. A—— informed me that the only

regular applicants for quinine, are one or two families in the fork of Banister and Dan, where there still exist extensive undrained flats. But although the ague and fever proper, is of rare occurrence in the county, yet it is by no means intended to be asserted that there is an end of diseases caused by marsh miasmata. A sufficient number of mill ponds yet exist, to poison the atmosphere, to a considerable extent, with their noxious exhalation. Our bilious and continued fevers are as regular visitants as the seasons themselves. More than a moity of these are, doubtless, caused by mill ponds and undrained flats. Dr. A——— related a fact in relation to Mr. A———'s plantation, that might shock the fancied security of those who believe that they are out of the influence of malaria, merely because they are out of the vicinity of a mill pond. The flat land of this plantation contains five hundred acres, the whole of which was kept wet by a small stream that ran through the body of it, with so little fall as to enter the Banister at an oblique angle, in the direction up-stream. The large body of flat land has been effectually drained, and the river Banister well diked. Dr. A——— informed me, that before this improvement, this plantation was a fruitful hot-bed of disease—so sickly, that he would not have risked the health of his family upon it, one year, for the value of the estate. Since it has been drained and diked, he regards it as healthy as any situation in Halifax county. This dike, I am informed, is well executed, and perhaps the largest work of the kind in the county of Halifax. Although I have seen it once, (several years since) such a minute and accurate observation of it was not made, as to justify an effort at a detailed account of its operation.

Before closing these promiscuous remarks, it may not be improper to notice a vein of large, round, black rock, that runs through Halifax, Charlotte, Prince Edward, &c., which has been before noticed, by Dr. Morton of Prince Edward, in the Farmers' Register. Some of the most fertile plantations, in the counties just mentioned, lie adjoining, or near this vein. Mr. J. Edmunds' plantation, (of Charlotte,) is intersected by it. The land near it, seems to have derived its fertility from the disintegration of a ferruginous rock, which contains, occasionally, sulphuret of iron, and also lime. I have seen several tracts of land, very *obviously* improved, by the disintegration of bog iron ore, in the part of Halifax above referred to; for, frequently, in the same plantation, the grade of fertility varied with the presence of more or less of this rock, disintegrated into a round, rusty looking gravel. A *survey* of the soil of the counties lying at the foot of the last parallel hills of the Blue Ridge, would furnish an interesting subject, to a well informed mineralogist—particularly with a view to ascertain their mineral ingredients. The presence or absence of a rich mineral ingredient, seems to constitute the great difference between the soils in this section of the state.

E.

From the Genesee Farmer.

IMPREGNATION OF PLANTS.

[The January number of Professor Silliman's Journal—a work which deserves the support of all interested in the higher departments of the natural sciences—in addition to a great variety of other valuable papers, contains one by Dr. Gray, of New York, being in part a translation of the celebrated Corda's researches on the impregnation of plants. As the subject is one of interest, we have thought that a condensation of the paper, adapted to the general reader, might prove acceptable to at least some of the readers of the Farmer.]

"*Omne ex ovo*, everything from an egg," was the exclamation of an old philosopher, in regard to the animal creation; and later investigations show that it is scarcely less applicable to the vegetable one. The fertilizing properties of the farina or pollen of plants has long been known, but the manner in which this effect was performed, as was to be expected where the operation was conducted in the silence and mystery of nature, led to a great variety of speculations. Every farmer knew that the yellow dust, which fell in such quantities from the corn blossoms upon the silken tassels of the ear, was necessary to the formation of the kernel, but few are able to explain the cause of this necessity, or the mode in which the plant was rendered fruitful. Every housewife has, during the summer months, seen her reservoirs or cisterns of rain water covered with a yellow powder, which by most is considered sulphur, as it appears most plentifully during thunder gusts accompanied by high winds. The peculiar odor which belongs to this substance when burning, may have assisted in originating the error with regard to the origin of this dust, which is the pollen of the forest trees, as any one may be convinced by walking in the woods when this fecundating dust is falling. This dust may be easily seen and collected for observation on the blossoms of the different varieties of the melon, pumpkin, and cucumber.

Pollen, when examined by a moderate magnifying power, is seen to consist of a multitude of grains of some regular form, which is uniform in the same species, but often widely different in different kinds of plants. These grains are composed of two coats, of which the exterior is thick and nearly elastic, while the inner is exceedingly delicate and highly extensible. The cavity is filled with a fluid which, under a powerful lens, appears slightly turbid, on account of a vast number of minute granules which float in it. A magnifying power of three hundred reveals the existence of two kinds of granules in the fluid of the pollen grains. The first is large and few in number, and from the 4000th to the 5000th of an inch in diameter. The smaller particles, or *molecules*, as they as they are termed by Brown, who here seems to have led the way in the discovery, are from the 15,000th to the 30,000th of an inch in diameter. The microscope shows a motion of these particles in the fluid, movements not confined to a mere change of place, but a change of form in the particle itself; and Brown asserts that he was "convinced from repeated observations, that they are produced neither by evaporation nor currents in the fluid, but they pertain to the particles themselves."

But whatever may be the nature of this fluid, or the granules it contains, it is evident that to the pollen, the power of impregnation belongs, and

three hypotheses have been advanced to account for its agency in the production of the vegetable embryo. According to one view, a germ furnished by the pollen is supposed to be deposited in, and nourished by the *ovule;* according to another, the germ is thought to be originally formed in the ovule itself, and is merely excited to action by an influence derived from the pollen; while according to the third, the embryo is conceived to result from the union of a germ furnished by the pollen with another produced by the ovule. Recent discoveries have rendered it probable that the first supposition, though attended with some difficulties, will be found nearest the truth.

It was discovered by Needham that grains of pollen, moistened or thrown upon water, burst with violence, and discharge the slightly viscous and turbid fluid contained in them. This effect was also sometimes produced when the pollen fell on the moist surface of the stigma, and thence to this fluid the immediate agency in impregnation was attributed by Linnæus and contemporary botanists, they in general supposing that the fluid was directly conveyed down the style to the ovule where the fecundating power was exerted.—Whatever speculations might have been on the subject, the actual knowledge of naturalists was confined to the simple fact, that the application of the pollen to the stigma was essential to the fertilization of the ovule; all the information gained respecting the action of the pollen after it has reached the stigma being of recent date.

The very great improvements made in the microscope within the last twenty or thirty years had prepared the way for further advances in science, and the career of discovery in the impregnation of plants was opened in 1823 by Prof. Amici of Italy. In examining some grains of pollen on the stigma of the *Portulacca oleracea*, or common purslain, he observed that the grains had projected from some part of their surface an exremely slender tube, which was found to consist of the inner lining of the pollen-grain protruded through the external coat. Amici published the result of his discoveries, which immediatly attracted the notice of Brougniart and Brown, the first of whom published a memoir in 1837, to which we are indebted for the earliest and most complete account of the manner in which these tubes originate and act upon the stigma. When grains of pollen fall on the stigma, they are retained either by the hairs with which this organ is often provided, or by its slightly humid and viscous surface. This moisture they slowly absorb, and after an interval varying from an hour to a day or more, the outer coat opens by one or more coats or slits, through which the highly extensible inner membrane protrudes like a hernial sac, and is slowly prolonged into a delicate tube. These tubes are so extremely attenuated, that a powerful microscope is required for their examination.

The grains of pollen produced by some plants, (particularly the family of the *Cucurbitacæ,*) are known to protrude several tubes from different points, and Amici detected as many as twenty or thirty from a single grain. One of the most singular facts shown by the investigations of Brown was, that the stigma of one plant would excite the same action in the pollen of different species, and even of plants belonging to different families. Thus Dr. Brown applied the pollen of a species of Asclepias to the stigma of an Orchideous plant, and found these tubes produced as readily as when in contact with the stigma of the plant from which the pollen was taken. Here was a clue to the manner in which hybirds were formed; and a plausible reason shown why the seeds of such plants, when grown, did not resemble the fruit from which they were taken, but showed a disposition to revert more or less to their original type, according to fundamental law of nature.

The tubes thus produced from the pollen when placed in contact with the stigma, penetrated its substance, not however by means of any particular channel, but by insinuating themselves between the cellules, and along the intercellular passages which abound in the tissue of the stigma and style. M. Brougniart was able to follow them for only a moderate distance into the tissue of the style, where he imagined the tubes terminated, and opening at the extremeity , discharged the fluid and floating particles of the pollen grain. Dr. Brown was more successful in tracing their course. He followed the course of the pollen tubes in several plants of *Orchidea* and *Asclepiadea* from the stigma to the placenta, and in a single instance, in an Orchideous plant, traced some vessels or tubes of an equivocal nature quite into the aperture of the ovule. Dr. Brown published an account of these discoveries in 1831, and remarks that Mr. Elliott, in his Botany of South Carolina and Georgia, had observed these *cords* or *fibres* in the Ascelpias, but it is probable their origin or office was not suspected.

Such was the state of knowlegde respecting tho impregnation of plants, when M. Corda, a member of the Imperial Academy, commenced his observations. Dr. Brown had traced the pollen tubes to the mouth of the ovules, and M. Corda devoted himself to determine the interesting inquiry as to their farther progress and termination. As subjects of examination, he selected the *Coniferæ* or fir tribe, in which the ovules are naked, and impregnated by immediate contact with the pollen, consequently offering great facilities for the investigation. Aided by powerful instruments, and conducting the processes with great skill and perseverance, M. Corda was able at last to trace the pollen tubes into the ovule itself, where the fluid of the pollen gave tne first impluse to the formation and developement of the embryo. The following is the summary of the discoveries made by M. Corda, translated from his memoir by Dr. Gray, and which in the *Coniferæ* establish these positions:—

"1. The pollen tube penetrates into the micropyle, (exostome,) and in Pinus the pollen grains fall directly into it, whence the impregnation is immediate.

2. The pollen tube passes through the exostome into the endostome, passes through the cavity of the secundine, and arrives at

3. The nucule or ovule; extends through the endostome into its cavity, and

4. By the injection of the fluid contained in the pollen grains in the bottom of the nucule gives the first *keim* (germ) to the formation of the embryo.

5. The formation and development of the embryo changes the contents of the cellular tissue of the nucule, which becomes fluid, and appear to furnish materials for the growth of the embryo.

6. The pollen tubes remain fixed (to the embryo sac) sometimes after impregnation and the commencement of the development of the embryo in the latter.

The translation of the memoir in the Journal, is accompanied by a series of engravings representing the process of impregnation, from the formation of the pollen tubes, to their entrance into the ovule and the discharge of their contents, embracing the first rudiments of the embryo.

To the Editor of the Farmers' Register.

ABUNDANCE OF THE RESOURSES FOR MANURE, AND FOR THE IMPROVEMENT OF THE SOIL.

Mecklenburg, Va., May 10th, 1737.

Enclosed, I send five dollars, for the fifth volume of the Register, which I pay, the more cheerfully, that I am assured I shall (as heretofore) get the worth of the money, in the instruction and entertainment to be derived from reading its pages. I also avail myself of this opportunity to offer an humble mite for publication—not that I have the vanity to think I can throw much light on any subject connected with agriculture; but, upon the presumption that there are none so learned but that they may learn yet more, and none so ignorant, but that they may impart some useful hint; and I shall offer the following, which you can reject or publish, as may seem to you best.

We meet with many plans and schemes in our agricultural journals for the improvement of our impoverished soil, such as sowing clover and grass seeds, cutting hill-side ditches, dividing farms into three, four and five shifts, &c. &c. But it is not possible, in my humble judgment, to bring about any thing like a striking or even perceptible improvement of worn out or poor land, by any or all these combined, without the aid of a yet more efficient agent. As a general rule, no system can be laid down, for the improvement of land, in which *manure* is not the principal agent. You may improve the beauty of your fields by hill-side trenches, you may in some measure hide the galls and gullies, by suffering the broom straw, weeds, and briers to grow up on them, and you may perhaps keep the land at something like its present productiveness, by not grazing, and resting, and securing it from washing, &c. But in vain shall that man look for improvement, whose cattle are fed on the commons, without farm-pen or barn, whose horses are suffered to stand and lie without litter or bed, and who, in short, has no well devised and industriously practised plan of saving manure. It is surprising to see what apathy exists in my neighborhood on this subject. Even now, (the 10th of May,) you will scarcely find a summer cowpen, ready to receive the cattle at night, and to receive the manure: "where they fare best, there they stay longest," and where night overtakes them, there they lie down, and there they drop the manure; as apt as not on some public highway.

There are very few men who seem aware of the facilities they possess for raising or rather accumulating manure. An eminent improver was asked where he had obtained manure enough to enrich his land as he had done? Where could such a quantity come from? He replied, "that it would be hard to find the place that it could not be procured." Here was the remark of a wise and practical man. The words are few, but they weigh most heavily. They most forcibly, because most truly, address themselves to every planter! "Who hath ears to hear, let him hear." Nature has been most bountiful in her supplies; every provision has been made; nothing remains but for art and industry to make the application. I was not long since informed that a gentleman, late a resident south of Dan river, not succeeding in manuring his tobacco lot with stable and farm yard manure, completed the deficiency with leaves newly hauled from the forest, and ploughed in; and that no difference appeared in the crop grown on the lot. I once tried a similar experiment on a small piece of branch flat; the first crop of tobacco failed. on account of the too great abundance of leaves, and the dry summer; but every successive crop of tobacco, wheat or clover, for ten or twelve years, was most luxuriant. Previous to this application of leaves, (which was made in the month of April,) the land, though naturally rich, had been exhausted and was barely in tobacco heart. I have been informed that Mr. James Brooks, formerly of Charlotte, an eminent planter, succeeded completely by using leaves, and it is well known that few men made such good crops as he did. I state these facts, not to advocate or recommend the use of leaves unmixed, (for using them to catch and absorb the juices of the stable and cowpen, &c., is doubtless better,) but to show that one means of manuring, at least, is in reach of almost every planter. I was last year in the county of Brunswick, and observed some planters collecting the pine tags, for littering their stables and cow pens, and was informed that they preferred them to the leaves of other trees, and that it had a fine effect when gathered with hoes, hauled on the land untrodden, and ploughed in. One of my friends, who ranks high as an improver, has long been in the habit of mowing over his low-ground meadow the first autumn after seeding, for the double purpose of cleaning the meadow and collecting litter for his stock, (from which, by the way, they collect some sweet morsels). The banks of his ditches, and every other foul spot, were trimmed for the same purpose. I think he was particularly partial to this sort of litter. He once hauled out, on a hill-side convenient, the earth thrown out of a ditch, and used it as a covering for the corn. The consequence was, a crop of nine barrels and two bushels of corn to the acre, and a premium from the Agricultural Society, for "the best two contiguous acres of up-land corn." Some gentleman humorously argued, that he could not claim the premium, as "it was not *exactly* up-land corn." We should all be very glad to raise such *low-ground* corn on our up-lands. I once applied several loads of unrotted or new saw dust to a piece of poor thin pipe clay flat, and the tobacco was fully equal to that which grew on the same sort of land adjoining, manured with good stable manure. The garden which I formerly cultivated, was a stiff red soil, and it occurred to me that a kind of soft rock, dug from the bottom of the ice house, (of a yellowish color, mixed with a white chalky substance, which after being exposed to the frost, assumed the appearance of fine sand) would render the stiff soil light. I accordingly covered one square with it. It produced the desired effect, and the square be-

came the most productive one in the garden. My garden would not produce the cucumber, except in very wet seasons. I resorted to the following plan, which gave me great plenty. I dug square holes, a foot wide, and eighteen inches deep, and filled them with light alluvial earth from the branch, hilled on them and planted the seed and cultivated as usual. Having failed to complete the manuring of a lot with stable and farm-yard litter, I went into a piece of rich wood-land, which I never expect to clear, and scraped up the leaves and light vegetable mould at the surface, and have thus, with the aid of various other subjects, finished the lot, and intend to watch closely into the effects of the different kinds of manure, and shall send the result for publication in the Register. I flatter myself the woods scrapings will do nearly, or quite as well as the stable manure.

I came to live at my present residence last fall, and had but little chance to raise manure; but I ploughed up my lot, and determined to manure it "by hook or by crook." My predecessors had relied more on clearing for tobacco, than manuring, and thus many rich deposites had, for years, remained unmoved. Around the ley hopper and out-houses, we found beds of ashes and other offal, in considerable quantities. The wood pile afforded a considerable quantity, (and by the by, one of my friends uses this kind of manure successfully on plant beds). The offal of the garden too, which had accumulated for years, in a bank around the garden, was another fine source. The fence corners near the residence, afforded a considerable quantity, as will be the case about all old settlements where they are not occasionally cleaned out. Thus I succeeded in manuring my lot as heavily as I wished, and have the satisfaction to find that there yet remain many resources untouched—and I am ready to exclaim with the wise one before quoted, "where is the place in which manure cannot be found?" It is not the want of materials to improve our soil that keeps it declining; it is sheer neglect. Many planters persuade themselves the thing cannot be done, or look upon it as a thing to be thought about and not acted on. They sow clover seed and dream of verdant fields, teeming udders, fat beef and mutton, and rich land; but the clover fails, the udder dries up, the kine are lean, and the land poor, and all for want of manure, or, more truly, for want of its application. Others dream of the fat and teeming soils of the west; they have found visions of gain without labor, flesh without feeding. They look over to that land of promise, all is rich and alluring in their heated imaginations; they turn again and look on the poverty stricken old field, they sigh away the last hope, and rather than make the best of the present ill, "they fly to others that they know not of," and they prepare for themselves long years of regret and sorrow. They sever ties of friendship and kindred, and all for nought. They sigh too late for their "*father-land.*" Alas our beloved *Old Dominion!* How long will your sons forget their filial love and duty and turn your glory into shame by desertion in your utmost need? Had half the labor and expense that have been spent in emigrating to, and reducing the forest of the west, been devoted to enriching and beautifying your soil, not England's self would have, at this day, displayed such beauty and luxuriance. Away Mr. Editor, with that class of agriculturists who treat the subject of improvement as visionary, and scout at what they call "book farmers."

I have thus stated a few facts, and made some reflections which I hope may awaken the attention of others to this subject, and shall be amply repaid for the labor of writing this communication, if it serve to increase the use of manure to the amount of one dozen loads. I will in conclusion hazard an opinion, which, among physicians, would probably entitle me to the charge of quackery, if applied to diseases of men—that the all-wise Creator has provided a remedy for every ill. That he has provided and placed in our reach, materials to manure every variety of soil—in some places marl, others lime, and in others gypsum, and that no place intended for cultivation is left without the reach of something to increase and perpetuate its fertility, and that it only remains for the art of man to discover, and his industry to apply it. And these facts and this opinion are stated to attract the attention of planters, and to elicit inquiry and experiment in regard to the endless variety of material and resources for manuring.

A. C. MORTON.

From the Cultivator.

FACTS WORTHY OF CONSIDERATION—ESPECIALLY FOR LEGISLATORS.

Five millions of agriculturists in Great Britain furnish subsistence for her population of sixteen to eighteen millions of people. Great Britain imports but a small amount of provisions.

Twelve millions of agriculturists in the United States *do not* furnish subsistence for a population of sixteen millions. We import bread stuffs, now, from almost every country of Europe.

Whence this mighty difference? It is not owing to the natural inferiority of our soil, nor to the inferiority of our laborers in physical strength and industry. In both these we claim to have the advantage of the old continent; but it is owing to the neglect of our legislators and statesmen, to patronize and aid this great primary branch of labor—it is for want of that aid which government and science give there, and which they do not give here. *There* we see established schools of agriculture, boards of agriculture. *Here* we see neither. *There* agricultural science constitutes a branch of instruction in the primary schools, and practical instruction is [not] dispensed in those of higher grades. *Here* our schools do not afford instruction in either the science or practice. *There* large sums are disbursed from the public treasury, to make agricultural surveys, to publish standard works on husbandry, and to call forth genius and skill, by liberal rewards and distinctions. *Here* government expends nothing for these objects. *There* agricultural improvement is promoted from state policy. *Here* it is neglected, because it has no *quid pro quo*—nothing to offer to gratify the short-sighted cupidity of party. Our statesmen are so greedy for the sixpence that is close to their eye, that they do not see the dollar which beckons them from the distance. The landed proprietors of Europe generally possess intelligence and influence, which they effectually exert, in combined effort, to increase the products of their estates. *Here* the proprietors are too often uninformed and spiritless, having no concert, and tamely submitting to the miserable pittance

which their public servants may find leisure or inclination to dole out to them.

Thirty years ago, what was the state of our manufactures and mechanic arts compared to what they are at the present day? What art has remained stationary? Manupilation has given way to machinery—science has shed her effulgent light upon processes which were before obscure, tedious and uncertain—and inventive genius, roused from its torpor by the spirit of improvement, has been actively at work, in perfecting the mechanic arts. Where is the man who, in any of these arts, follows, in his business, the practice of his father, that is successful in his calling? All is changed—all is improved. And how fares it with agriculture? This primitive art, too, has felt the impulse of improvement, though yet in a partial degree. Some portions of her labors have been blessed with an abundant increase, while other portions, practising on the model of "our fathers," remain at a fearful distance behind the age. In most parts of northern Europe improvement has progressed, and is progressing. English husbandry has been greatly improved, and Scotch husbandry still more so. France is in the progress of rapid improvement in her agriculture; and the agricultural schools of Fellenburg and Von Thaer are fast diffusing a knowledge of the science and of the best practices of husbandry over the wide-spread German empire. With us, while some districts, and many individuals, have made creditable advances in agricultural improvement, the mass of our farmers, we regret to say, are just where they were *thirty years ago*, apparently unconscious, that while they have remained stationary, the world about them has been continually advancing in intelligence and improvement. Much has been dono, and more remains to be done, to improve our farming; the spirit of inquiry and investigation is abroad; much useful information is being diffused in our agricultural journals, which are increasing in interest, in numbers and in circulation; and it is hoped that our legislators will ere long find leisure to turn their attention to this great interest, and assist to elevate it to the rank to which it belongs, as well in a political as in a pecuniary point of view. For agriculture, in reality, constitntes the foundation upon which the fabric of our social, moral and political institutions are based, and upon which they must ever depend for support and prosperity.

IMPROVEMENTS IN LOG HOUSES, AND IN THE FORM OF POSTS FOR PLANK FENCES.

To the Editor of the Farmers' Register.

Powhatan County.

* * * * * *

Since writing the above, I have concluded simply to give you a plan upon which we build log houses in this neighborhood; not *generally though*, for some of the *old fashioned folks* will not give up the *good old way* of doing every thing as their fathers did before them. Instead of notching the logs, we have them flatted on two sides, and put up, one on the other, as you would make a common pen of fence rails. This is for tobacco houses, or any that we do not care much about the looks of. To make a house look well, square the ends of the logs, and by being particular to have each log sawed off the exact length, a log house may be put up with as true corners as a framed one, and it is the opinion of all that have tried them, that they will stand much better than those notched, especially if they are *boxed* (a plank nailed on at the corner, from the plate to the ground).

While I am writing, I will give you my plan for making plank fences, (though it may not be new to many of your readers, it may be to some). The principal advantage I see in it, is the form of the posts, which I think will make them last much longer, though I may be mistaken. I have my post timber hewed twelve inches square. I then have it split through the centre, with a saw, which makes two pieces, six by twelve; they are then split again the other way; beginning three inches from one edge of the timber, and crossing to three inches on the other side of the opposite end. I had my posts six feet long; six by three inches at top, and six by nine at bottom; the top was sloped, and a plank five inches wide, nailed on the top of the posts, and on the edge of the top railing, which preserves the posts from the weather and strengthens the upper railing. Some may think that I must think other people have very little sense to publish this, with the idea that it will benefit any one. One of my neighbors thinks it is an improvement, and has adopted it, *although* he is one of the old *fashioned*.

A FRIEND TO IMPROVEMENT.

From the Cambridge Chronicle.

IMPROVEMENT OF AGRICULTURE IN MARYLAND.

Extract from the Report of the Committee on Premiums of the Dorchester Agricultural Society.

Your committee respectfully report that they have deliberately viewed the subjects submitted to their consideration, by the Dorchester Agricultural Society, and they offer the subjoined "articles of association" and "scheme of premiums," with some reflections *explanatory* of their views of the great purposes of this institution, and of the extension of the scheme to objects not usually embraced by similar societies.

The agricultural interest of Dorchester county, and indeed, of the state of Maryland, is, by common consent, acknowledged to be in a state of the lowest depression, and most deplorable condition, embarrassing to all who are concerned in it, directly, or indirectly.

The great staple crop, wheat, has failed, for very many years, to compensate the costs and the labor of its culture.

The climate has, manifestly, become adversary to the growth of this plant, "once the boast and the wealth of our country."

To supply this loss by the introduction of other plants, whose physiological character and habits may be better adapted to the present climate, is a problem, which merits the first consideration of this society; and whose solution requires much experiment, cost and labor; and is well worthy to have received, long ago, the aid of legislative wisdom, which in many other states has been liberally contributed.

Your committee will not withhold *this clear truth*, "that without speedy relief, the agriculture

of the state will be annihilated, by the emigration, or the bankruptcy of its *discarded* votaries.

Individuals cannot, in justice to themselves, incur the expenditures, inseparable from such experiments. The state, through her honorable [legislative] body, has been often invoked for relief, and as often, she has refused her fostering hand.

Under the pressure of these circumstances; of this paradoxical policy and marvellous apathy of that honorable, we will not on the present occasion, presume to say, "sagacious body, which overflowing in their charities and kindness, have seen fit to practise liberality, and copious beneficence, in their bounties to all branches of human industry, within the sphere of their action," excepting only, that which is the object of our present solicitude, on which too, all others must chiefly depend—under these considerations and these appalling facts, "it becomes the moral duty of this discarded class to look to themselves, and cherish the profession, on which they hope to subsist," by the small resources, which a few "*associated individuals*" may afford, who, widely differing from their honorable representatives, hold the *heretical doctrine*, "that agriculture," the denounced subject of legislative contempt, is one of the most prominent interests of the community.

Your committee from a view of the above most true, yet, lamentable premises, involving, "they are constrained to acknowledge the political honor, and intelligence, as well as the destinies of our native and beloved state, and the happiness of its citizens, conclude," that the most efficient application of the small funds of the society will be chiefly, for the introduction and encouragement of the growth and manufacture of *new species* of crops, which may have been elsewhere profitable.

To this view, they recommend a particular attention to the propagation of the *mulberry*, and the production of *cocoons* for silk.

The introduction of the *sugar beet*, and the *manufacture* of sugar.

The culture of *Spanish tobacco*, and its manufacture into cigars.

The culture of *hemp*, and others in general that may offer a prospect of fair remuneration for cost and labor.

From the New York Farmer.

SALT MARSH HAY FOR MANURE.

Mr. E. B., of Lynn, Mass., is of opinion that salt hay is worth five dollars per ton, for manure, to be spread on mowing land. He says he once spread a quantity of salt hay in the spring of the year on some low grass land, and the yield of grass was as great as ever had been under any circumstances. It is very valuable as litter under cattle, and forms a most valuable ingredient in compost. The above authority is that of a careful and honest farmer; and deserves entire confidence. Salt hay is generally estimated of two-thirds the value of English. There are several kinds of it, some of it too coarse for any purpose but that of litter. We speak of the finest quality; when well cured it is eaten with great avidity by the cattle, and is substantial and nutritions. It will not answer for milch cows, as it very soon diminishes the secretion of milk. Of course it cannot be often afforded to use it for manure. In cases of extraordinary abundance, however, or low price of English hay, or of damage to the salt hay in curing, from the tide or rains, it may sometimes be profitably applied as manure. The fact of its successful application in this way is at least worth recording.

H. C.

SPECIMEN OF THE ORDINARY PUFF-EDITORIAL, AND THE MANNER IN WHICH SUCH ARE GENERALLY SUPPLIED.

———, 29*th April*, 1837.

EDMUND RUFFIN, ESQ.,
Petersburg, Virginia.

Sir—I have received a letter from ———— ———— now in England, requesting me to have inserted in your valuable journal, as an *editorial article*, the annexed statement, and when the sale is determined upon, you shall receive an advertisement thereof, for insertion. Any charge you make, will be paid on demand. Please send me a number containing the annexed note.

Very respectfully,
Your obedient servant,
——— ————.

Short Horn Cattle.

We learn with much satisfaction that a distinguished American agriculturist now in Europe, has prevailed upon Mr. J. Whitaker, of Yorkshire, to send a part of his superior herd of "Durham short horns," to this country, for sale by auction, and that they may be expected to arrive early this summer; we also understand the sale will take place in the neighborhood of Philadelphia.

It may not be improper to observe, that Mr. Whitaker is the most celebrated and successful breeder of Durham short horns, in England, and it is principally from his stock, that Col. Powel and the Ohio Importing Company, have made their best selections for some years past, and they are universally acknowledged to be the finest cattle ever brought to this country; a rare chance will therefore, now be offered for obtaining choice and pure animals, without the risk or expense of a sea voyage.

We have complied with the above requests, though in a manner somewhat different from that desired by the writers. We wish it to be understood, and hope that it will be hereafter understood distinctly, that, however much the practice of puffing by means of suppositious *editorial* articles may be sanctioned by general usage, it never has obtained, and never shall, in the Farmers' Register. Further—not a line has ever appeared "as *editorial*" in this journal (whether designated by the type, or otherwise) that was not truly the editor's—and we have never made a pecuniary charge for inserting editorial or other articles in the Farmers' Register—nor in any other manner than for advertisements on the covers, at regular and stated prices. Therefore, the above publication is of course made free of "any charge" to the writers, save the infliction of these comments. We are pleased to give information of every new effort for the improvement of agriculture—and still more so when the praiseworthy improvers are themselves benefited by the annuncia-

tion, as well as the public whom they have served by their labors and talents. But we do not *hire out* either our *pages*, or an *editorial mask*, for the purpose of puffing the commodities of any salesman, whether of high or low degree.

We are sensible that this dishonorable practice is so general, and so perfectly understood by the initiated, that those who propose to obtain and pay for such a deceptious mode of reaching the public ear and confidence, consider it as requiring nothing unusual, and certainly not as an insult to the editor, and a designed fraud on the public. But for this supposed mode of thinking, the foregoing "editorial" and requests would not have been sent us by persons with whom we have no personal acquaintance, and have had no previous transactions whatever. We have also seen the same article, given "as editorial" in at least one late paper; and the publication in nearly the same words thus asked of several editors, would of itself serve to betray the common origin of all. If correspondents (whether for their own or the public good,) see fit to write pieces to appear as "*editorial*" they at least ought, in common decency, not to make several different "cat's-paw" editors present their several apparent productions in nearly the same form and words.—Ed. Far. Reg.

MONTHLY COMMERCIAL REPORT.

The disasters which have been accumulating for some time past, have now produced distress, and absolute ruin, to an extent that it is painful to describe. The newspapers teem with accounts of the wide spread desolation which has overwhelmed the country. The agricultural and commercial interests are prostrated, and have involved in their ruin the banks and the public finances of the country. It is needless to do more than refer to the daily journals for the particulars, and to record the general result.

The removal of restraint on the state banks—the increase of their temporary means for granting loans, by the deposite of more than forty millions belonging to the federal government in their vaults, which were made its treasury, on which they were allowed, and in express terms authorized, to extend facilities—the consequent increase of loans and issues of paper, thus creating high prices and wild speculation—the heavy drain of specie from Europe, which rendered counteraction there necessary; all these causes have produced a prostration of credit abroad and at home almost unparalleled. The contraction, which must necessarily have taken place, sooner or later, has caused mercantile failures in number and amount exceeding all former precedent; these have been followed by the suspension of specie payments by the banks, and, as a necessary consequence, by the inability of the government to pay its debts in the only currency which the law recognizes, and which it requires from its debtors, without a possibility of compliance on their part. An utter derangement of the currency exists, and there is now no legal circulating medium.

The country never before exhibited such a scene of distress, from which none, whether rich or poor, are exempt. There is now no medium of exchange between different places, whether near or remote. Private bills of exchange are discredited, and the banks cannot furnish drafts on each other. Those drawn by one bank on another have been protested, and even those drawn by the government on its selected depositories are in some instances before they can be resumed: the laborers who were employed on them deprived of the means of subsistence. Many manufactories are closed, while the raw materials they used are reduced in price to a lower rate than was ever before known, disgraced. Remittances cannot be made; the traveller can obtain no currency which will pay his expenses from one state to another. Even postages and petty expenses cannot be paid in the silver which is required, unless by purchasing it at a high premium.

Already corporations and individuals, in those states where the prohibitory laws are not very severe, issue bills for sums of five cents to a dollar, to be circulated as change, and some of them probably never to be redeemed. The state of things, in this respect, which existed about the year 1814, has returned, but in an aggravated form, for private credit does not exist. How long it is to continue cannot now be foreseen—mercantile industry and enterprise are prostrated—commerce is at a stand, and the evils which originated in this country are extending to those with which we had the greatest intercourse.

The national and state legislatures are called to convene for the purpose of devising remedies or palliatives for these evils; evils which have long been anticipated, and efforts made in vain to avert them. In the great markets, the prices of produce are scarcely quoted—means cannot be found to purchase it. In New Orieans a few sales of Alabama and Tennessee cotton of average quality are made at 6 to 7 cents—of Louisiana and Mississippi at 8 to 9; flour at $5\frac{3}{4}$ a 6. Consignees of tobacco in that city, have, in some instances, been unable or unwilling to advance money for the freight, and the municipal authorities have taken charge of it.

In our own market, the only sales of cotton are to the mills—the highest price 10 cents, and ranging down to 6 cents. Tobacco, which the planters bring slowly to market, sells at $1\frac{1}{2}$ to $5\frac{1}{2}$. At present there is no price for wheat, and should an average crop be made, of which the prospect is unfavorable, it is not seen how, in the present state of things, the millers will be able to obtain funds to purchase it, faster than they can sell and realize cash for the flour.

So completely is commerce between neighboring cities interrupted, that wheat is quoted on the same day, and of the same quality, in Philadelphia, at $2, and in N. York, at $1 50.

The price of flour in Richmond is $6\frac{3}{4}$ a $7—mere retail sales. In New York, $8\frac{1}{2}$ a $9\frac{1}{4}$.

The cash sales at auction, of some articles, are greatly below the cost in the country whence they are imported. Coffee, for example, has been sold in New York, at 8 to 9 cents—West India sugar at 6 to 7 cents—while the same articles cannot be purchased on credit at prices at all proportionate.

Stocks of almost every description have been sold, in the large cities, lower than at any former period: some at one half or one third of their par value. The suspension of specie payments has tended to advance the prices of stocks and of articles generally; but specie has at the same time advanced in the same ratio, being now at a premi-

um of 8, 10 or 12 per cent. Exchange on England, when undoubted bills can be found, is at 15 to 18 per cent. premium.

Many works of public utility, which had been commenced, are suspended, and may go to decay and those who depended on them for employment are left destitute.

The importations of grain from Europe continue to be very large. In the course of two days, about 200,000 bushels of wheat and rye arrived at N. York from various parts.

Comparative statement of banks in the U. States.

	Jan. 1, 1830.	Jan. 1, 1837.
Number of banks,	320	677
Capital,	$ 145,192,268	$ 324,240,392
Circulation,	61,323,598	185,762,506
Deposites, public and private,	55,559,928	154,541,894
Discounts,	200,541,214	590,892,661

Quotations in New York at an interval of six months.

	Dec. 14, 1836.	May 14, 1837.
Bank United States,	120	110
" Manhattan,	133	100
" Phœnix,	124	76
" America,	124	92
Rail Road—Boston and Providence,	103	101
Rail Road—Utica,	117	117
Bank Notes—Philadelphia,	½ pr. ct. dis.	2 pr. ct. dis.
" Maryland,	½ "	2 "
" Virginia,	1 a 1½ "	4 a 5 "
" N. Carolina,	2½ a 3 "	5 a 10 "
" S. Carolina,	2½ a 3 "	10 a 15 "
" Georgia,	2½ a 3 "	10 a 15 "

X.

May 24, 1837.

PROSPECTS OF AGRICULTURE IN VIRGINIA.

In all the wide field now opened to our view of distress, bankruptcy, or ruin—agricultural, as well as commercial, and public as well as specially bearing on individuals—there is one sign and promise of a future better state of agriculture in Virginia—a state of more solid prosperity than has appeared for some years. The madness of speculation in western lands, and the consequent unusual flood of emigration from the old states, will be effectually destroyed by the absence or destruction of their *immediate* causes, viz: the late extravagantly high prices of cotton, and the means offered by the enormously extended bank paper circulation, in aid of all the mad operations of speculators. Had there been *no western country*, or had the relative advantages of both regions been truly known, Virginia would already have reached a high state of agricultural improvement and prosperity. Now, while the western states will continue to offer all their real advantages, those which were merely imagined, by speculators and their dupes, will disappear. The landholders of Virginia will, by a severe lesson, be taught the propriety of remaining at home, and improving the abundant resources of their own country. Let this but be felt, and properly acted on, for ten years, and a new face will be presented by agriculture. We are now a century in the rear of what would have been the improved condition of our territory, if this madness had not been continually operating to drain away the wealth, population, enterprise and talent of the state, and to reduce to the lowest possible grade the value of all that was left behind. It will now be found that most of those persons who have gone to the southwest, during this time of general delusion, have lost more than they have gained, and far more than they *might* have gained, by improving their land and resources in Virginia. Circumstances will now force our people to look to home for their chances for wealth and happiness—and they *must*, as soon as they begin to rise from the present state of prostration and despondency, begin also to improve, instead of hastening to abandon the land of their birth.

Perhaps, owing to our peculiar situation, no other individual has had such full opportunity to estimate the enormous amount of injury inflicted on agriculture by the spirit of western speculation, and the *expectation* of emigrating at some future time held by very many, who themselves actually have not yet carried, and now will not carry that expectation into effect No man will make improvements with spirit, zeal, or to much profit, however cheap and certain may be the means, who expects to sell his land at some future time, and is sure, from the continually falling prices, that he cannot then be repaid in purchase money for the cost of his most profitable improvements. We have felt the consequences of this state of things to bear heavily on this journal—both in affecting its pecuniary income, and still more in discouraging and frustrating its struggles to promote improvement. In a different condition of things, this journal, even though no better conducted, and no better aided, than it has been, could not have failed to do much positive and manifest good to agricultural improvement, and agricultural interests, throughout Virginia and the neighboring Atlantic states. To have added some millions of dollars to both the intrinsic and market value of lands, in lower Virginia alone, might have been safely reckoned on, but for the baneful adversary action of emigration. But all the good that it has been actually permitted to do, in the four years of its existence, has not been enough to counterbalance the enormous injuries caused by emigration, speculation, and the consequences of both. All the efforts made through the Farmers' Register, have not served to push the car of agriculture higher up the hill of improvement; they have merely "chocked" the wheels behind, and helped to prevent a more rapid downward career. Let but the efforts of all be now directed together, and to this one end, and the agriculture and the general condition of the commonwealth will yet, and speedily, be so elevated, and its territory be made so profitable and delightful a place of residence, as to prevent its desertion when the nation shall again go mad in speculation, even though western lands may be again the main field of operations.

In the general fall of prices, (which if not already exhibited, will certainly be so, soon or late, in every thing that speculation had improperly or fictitiously

enhanced in price,) our lands alone may be expected to rise, after sustaining, slightly and transiently, a decline of price at the present time, when the fall in other things is great, and will be permanent. But while all other things, as our slaves, crops, stocks, &c., were enhanced by the spirit of speculation, that same spirit was directed so strongly to western lands, that it actually *depressed our lands* far below their true value. Thus, where no improvements had been made, land was lower than at any previous time—and where improvements had actually advanced the prices of lands (as certainly has been done in the marled parts of lower Virginia,) still the increase was not a fourth of what would have appeared if there had not operated a general decline of price in all lands. Thus, the land that has been doubled in its gross products, and ought thereby to have been more than quadrupled in value, has perhaps not gained 20 per cent. in market price. The extraneous and ruinous influence of western speculation being now nearly removed, must serve gradually to cause lands to be estimated by their own value, and not by comparison with a fancied El Dorado, to be found in Mississippi or in Texas.

From the (British) Mining Jounal.

STEAM CARRIAGES ON COMMON ROADS.

Mr. Walter Hancock, accompanied by a party of gentleman interested in mechanical inventions, started on Friday the 21st., in "the Automaton," from the City-road to Epping. This line of road was selected by Mr. Hancock on account of its being, for the distance, the most hilly and uneven out of the metropolis. On arriving at Woodford, Mr. Hancock stopped the carriage, where he procured a fresh supply of water. After remaining for nearly a quarter of an hour; he again started at a rapid pace, and having ascended Buckhurst-hill at the rate of seven and a half miles an hour, entered Epping amidst the loud cheers of thousands who were collected in the town, it being market-day. The party returned to town; and the whole journey, notwithstanding the disadvantages before mentioned, was performed on the average of eleven and a half miles an hour.

SEASON AND STATE CF CROPS.

To this time, the spring has been generally and unusually cool—and therefore unfavorable to the germination and first growth of corn. Drought has also prevailed, and very injuriously to oats and clover especially, until within the last ten days, in which time rains have been both abundant and general. The wheat crops were rapidly improving, and promised much better than at our last report; but since then, the injuries from the Hessian fly, whose visitation we had hoped to escape this year, have become, in many places, manifest to an alarming extent—and it is now said, that on some farms, the crops of wheat, from this cause, added to those previously operating, will fail almost as completely as was the case generally last year.

Table of Contents of Farmers' Register, No. 2, Vol. V.

ORIGINAL COMMUNICATIONS.

	Page.
Bridges and abutments,	72
The means of making large quantities of manure, and the proper manner of applying it,	77
Hedges—Osage orange,	86
Easy means to prevent the ravage of black weevil,	87
Diking in Charlotte county,	116
Results of emigration to the west,	117
Rotatory steam engine,	117
Remarks on the soil and cultivation of part of the county of Halifax,	117
Abundance of resources for manure, and for the improvement of the soil,	122
Specimen of the puff-editorial, and the manner in which such are generally supplied,	125
Monthly commercial report,	126
Prospects of agriculture of Virginia,	127
Season and state of crops,	128

SELECTIONS.

	Page.
Report to the House of Representatives of the United States on silk,	65
Cultivation of spring wheat,	72
Food for silkworms,	72
Entomology—Habits of, and remedies for the cut-worm and the fruit curculio,	74
A prairie on fire,	76
Important experiments with canal boats at high velocities,	79
Observations ni several voyages and travel sin America, (extracts from an old publication,)	81
Introduction of turnip husbandry in England,	85
A new construction of railways,	87
Enactments during the last session of the legislature of Virginia, aiding canals, railways, roads, &c.	87
A new oleaginous plant,	89
Bone manure,	90
Bread as food for cattle and horses,	90
Use of human bones,	90
Water tanks,	90
Full directions for the manufacture of beet root sugar,	91
Great agricultural dinner at Markethill. Improvements by small farmers,	101
The patent retarder, or improved drag for carriages,	106
Old English fare,	107
Extension of beet sugar culture in Europe,	107
General remarks on the improvements and prospects of British Agriculture,	107
Management of the horse,	109
Impregnation of plants,	120
Facts worthy of consideration,	123
Improvement of agriculture in Maryland,	124
Salt marsh hay for manure,	125
Steam carriages on common roads,	128